

Mazak 

Operating Manual
for

QT-15N/18N

(Mazatrol T-32B)

Publication # M341SA0032E

Version KY1



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CAUTION:

- *This manual is published to assist experienced personnel in the operation, maintenance and/or programming of Mazak machine tools, and is not intended to be used as training documentation.*
- *All Mazak machine tools are engineered with a number of safety devices to protect personnel and equipment from injury or damage. Operators should not, however, rely solely upon these safety devices, but should operate the machine only after fully understanding what special precautions to take by reading the following documentation thoroughly.*
- *Do not attempt to operate or perform maintenance/repair on the machine without a thorough understanding of the actions about to be taken. If any question exists, contact the nearest Mazak service center for assistance.*
- *Certain covers, doors or safety guards may be open or removed to more clearly show machine components. These items must be in place before operating the machine. Failure to comply with this instruction may result in serious personal injury or damage to the machine tool.*
- *This manual was considered complete and accurate at the time of publication, however, due to our desire to constantly improve the quality and specification of all Mazak products, it is subject to change or modification.*

SAFETY PRECAUTIONS

The machine is provided with a number of safety devices to protect personnel and equipment from injury and damage. Operators should not, however, rely solely upon these safety devices, but should operate the machine only after fully understanding what special precautions to take by reading the following documentation thoroughly.

• BASIC OPERATING PRACTICES

DANGER:

- 1) Some control panels, transformers, motors, junction boxes and other parts have high voltage terminals. These should not be touched or a severe electric shock may be sustained.
- 2) Do not touch any switches with wet hands. This too, can produce an electric shock.

WARNING:

- 1) The emergency stop pushbutton switch location should be well known, so that it can be operated at any time without having to look for it.
- 2) Before replacing a fuse, turn off the main incoming power switch to the machine.
- 3) Provide sufficient working space to avoid hazardous falls.
- 4) Water or oil can make floors slippery and hazardous. All floors should be clean and dry to prevent accidents.
- 5) Do not operate any switch without a thorough understanding of the actions about to be taken.
- 6) Avoid accidental operation of switches.
- 7) Work benches near the machine must be strong enough to hold materials placed on them to prevent accidents. Articles should be prevented from slipping off the bench surface.
- 8) If a job is to be done by two or more persons, coordinating signals should be given at each step of the operation. The next step should not be taken unless a signal is given and acknowledged.

CAUTION:

- 1) In the event of power failure, turn off the main circuit breaker immediately.
- 2) Use the recommended hydraulic oils, lubricants and grease or acceptable equivalents.
- 3) Replacement fuses should have the proper current ratings.
- 4) Protect the NC unit, operating panel, electric control panel, etc. from shocks, since this could cause a failure or malfunction.
- 5) Do not change parameters or electrical settings. If changes are unavoidable, record the values prior to the change so that they can be returned to their original settings, if necessary.

- 6) Do not deface, scratch or remove any caution plate. Should it become illegible or missing, order another caution plate from the supplier, specifying the part number shown at the lower right corner of the plate.

• BEFORE POWERING UP

DANGER:

Cables, cords or electric wires whose insulation is damaged can produce current leaks and electric shocks. Before using, check their condition.

WARNING:

- 1) Be sure the instruction manual and the programming manual are fully understood before operating the machine. Every function and operating procedure should be completely clear.
- 2) Use approved oil resistant safety shoes, safety goggles with side covers, safe clothes, and other safety protection required.
- 3) Close all NC unit, operating panel, electric control panel doors and covers.

CAUTION:

- 1) The power cable from the factory feeder switch to the machine main circuit breaker should have a sufficient sectional area to handle the electric power used.
- 2) Cables which must be laid on the floor must be protected from hot chips, by using rigid or other approved conduit, so that short-circuits will not occur.
- 3) Before first time operation of the machine after unpacking it or from being idle for a long period of time (several days or more), each sliding part must be sufficiently lubricated. To do so, push and release the pump button several times until the oil seeps out on the sliding parts. The pump button has a return spring, so do not force it to return.
- 4) Oil reservoirs should be filled to indicated levels. Check and add oil, if needed.
- 5) For lubrication points, oil specification and appropriate levels, see the various instruction plates.
- 6) Switches and levers should operate smoothly. Check that they do.
- 7) When powering the machine on, turn on the switches in the following order: first the factory feeder switch, then the machine main circuit breaker, and then the control power on switch located on the operating panel.
- 8) Check the coolant level, and add coolant, if needed.

CAUTION:

- 1) During automatic operation, never open the machine door. Machines equipped with the door interlock will set the program to single step.
- 2) When performing heavy-duty machining, carefully prevent chips from being accumulated since hot chips from certain materials can cause a fire.

• **TO INTERRUPT MACHINING**

WARNING:

When leaving the machine temporarily after completing a job, turn off the power switch on the operation panel, and also the main circuit breaker.

• **COMPLETING A JOB**

CAUTION:

- 1) Always clean the machine or equipment. Remove and dispose of chips and clean cover windows, etc.
- 2) Make sure the machine has stopped running, before cleaning.
- 3) Return each machine component to its initial condition.
- 4) Check the wipers for breakage. Replace broken wipers.
- 5) Check the coolant, hydraulic oils and lubricants for contamination. Change them if they are seriously contaminated.
- 6) Check the coolant, hydraulic oil and lubricant levels. Add if necessary.
- 7) Clean the oil pan filter.
- 8) Before leaving the machine at the end of the shift, turn off the power switch on the operating panel, machine main circuit breaker and factory feeder switch in that order.

• **SAFETY DEVICES**

- 1) Front cover, rear cover and coolant cover.
- 2) Chuck barrier, tail barrier and tool barrier (NC software).
- 3) Stored stroke limit (NC software).
- 4) Emergency stop pushbutton switch.

• **MAINTENANCE OPERATION PREPARATIONS**

- 1) Do not proceed to do any maintenance operation unless instructed to do so by the foreman.
- 2) Replacement parts, consumables (packing, oil seals, O rings, bearing, oil and grease, etc.) Should be arranged in advance.
- 3) Prepare preventive maintenance and record maintenance programs.

CAUTION:

- 1) Thoroughly read and understand the safety precautions in the instruction manual.
- 2) Thoroughly read the whole maintenance manual and fully understand the principles, construction and precautions involved.

• **MAINTENANCE OPERATION**

DANGER:

- 1) Those not engaged in the maintenance work should not operate the main circuit breaker or the control power "ON" switch on the operating panel. For this purpose, "Do not Touch the Switch, Maintenance Operation in Progress!" or similar warning should be indicated on such switches and at any other appropriate locations. Such indication should be secured by a semi-permanent means in the reading direction.
- 2) With the machine turned on, any maintenance operation can be dangerous. In principle, the main circuit breaker should be turned off throughout the maintenance operation.

WARNING:

- 1) The electrical maintenance should be done by a qualified person or by others competent to do the job. Keep close contact with the responsible person. Do not proceed alone.
- 2) Overtravel limit and proximity switches and interlock mechanisms including functional parts should not be removed or modified.
- 3) When working at a height, use steps or ladders which are maintained and controlled daily for safety.
- 4) Fuses, cables, etc. made by qualified manufacturers should be employed.

• **BEFORE OPERATION & MAINTENANCE BEGINS**

WARNING:

- 1) Arrange things in order around the section to receive the maintenance, including working environments. Wipe water and oil off parts and provide safe working environments.
- 2) All parts and waste oils should be removed by the operator and placed far enough away from the machine to be safe.

CAUTION:

- 1) The maintenance person should check that the machine operates safely.
- 2) Maintenance and inspection data should be recorded and kept for reference.

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• WIRING

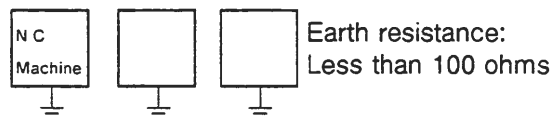
- 1) Use only electrical conductors with performance ratings equivalent or superior.
- 2) Do not connect any power cables for devices which can cause line noise to the power distribution panel, such as arc welders and high frequency machinery.
- 3) Arrange for a qualified electrician to connect the power lines.
- 4) Incoming supply voltage should not deviate more than $\pm 10\%$ of specified supply voltage.
- 5) Source frequency should be ± 2 Hz of nominal frequency.

• GROUNDING

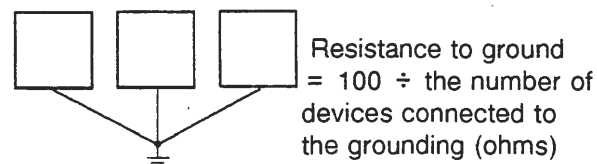
- 1) An isolated earth ground with a resistance to ground of less than 100 ohms is required. Typically, a 5/8" copper rod, 8 feet long, and no more than 5 feet from the machine, is sufficient. Building grounds or multiple machines grounded to the same ground rod, are not acceptable.
- 2) The wire size should be greater than AWG (American Wire Gauge) No. 5 and SWG (British Legal Standard Wire Gauge) No. 6.

Notes:

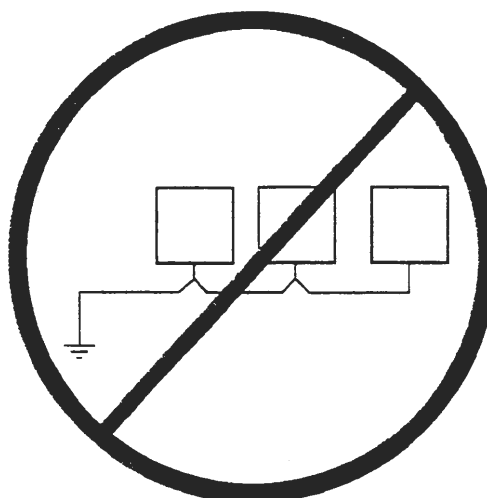
Desirable Independent Grounding:



Common Grounds:



Note: Never ground equipment as shown below:



Operating Manual for QT-15N/18N

Operating Manual for Tool Eye



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1. INTRODUCTION

This manual has been written and prepared for the purpose of conducting maintenance operation on **QUICK TURN 15N/18N** with **MAZATROL CAM T32B**.

In Chapter 1, the manual provides an understanding of precautions to use the machine safely, so that this can be in good user for Daily Safety Checking List.

In Chapter 2—SPECIFICATION and 3—CONSTRUCTION, the manual provides a preliminary understanding for operating the machine.

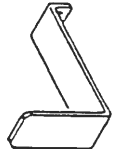
In Chapter 4—OPERATIONS, the manual provides an operational descriptions to permit full use of the machine. For further operational details and programming, there are separately prepared an Instruction Manuals for NC Unit and Programming. And for Special Accessories For Factory Automation Equipments (FA), also prepared a separate Instruction Manual.

In Chapter 5—INSPECTION AND MAINTENANCE, you will obtain the machine—associated knowledge necessary to operate and maintain the machine.

"A Collection of Machine Drawings" and "A Collection of Electrical Drawings," both under separate cover, should be jointly read and effectively used for maintenance operations. If any failure or other problem not covered in the present Maintenance Manual and associated drawings should take place, you are requested to take the trouble to contact our service center.

In Chapter 6—TOOLING, 7—CODE LIST and 8—TOOL EYE, the manual provides the description for tooling, code list and TOOL EYE.

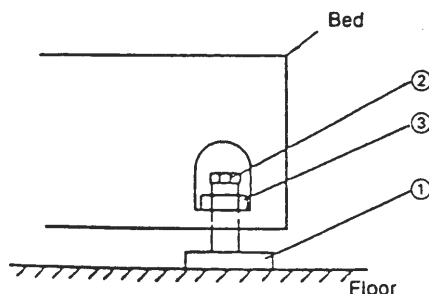
* It should be previously understood that a discrepancy or discrepancies may appear more or less between the contents herein and the machine itself, coupled with a revision or revisions of the present Maintenance Manual.

	Description, No.	Q'ty
	Minus driver 101300	1
	P01ML000080	
	Minus driver 7 × 125 (For dodecagonal turret)	1
	P01ML000040	
	Plus driver No. 2	1
	P02ML000020	
	TOOL EYE fixer	1
	43416604590	
	Hexagon socket bolt	2
	M6 × 12	

(10) Electrical spare parts
Fuse, etc.

(11) Basic parts

No.	Description	Geometry	Machine	With chip conveyor	With bar feeder
①	Plate		7 pcs	—	4 pcs
②	Bolt		7 pcs	—	4 pcs
③	Nut		7 pcs	—	4 pcs



1-3-3 Preparation before installation

(1) Environments

To install a machine tool, avoid such locations as referred to below.

- 1) where temperature may change remarkably, including a location exposed to the direct or near to a heat source.
- 2) where it is highly humid.
- 3) where there is a lot of dirt and dust.
- 4) where there is a vibration source in surroundings and
- 5) where the ground is soft and weak.

Notes

- 1: If a machine tool is inevitably located near a vibration source, it is necessary to take such action as to provide an antivibration ditch or the like.
- 2: If a machine tool is located on a soft and weak ground, it is necessary to reinforce the bearing capacity of soil by executing a work of piling or the like. Thus, the ground on which the machine tool is to be installed should be prevented from subsiding and/or inclining.

(2) Environmental condition (NC side)

- 1) Ambient temperature In operation 0°C ~ 45°C
- 2) Humidity Normally Relative humidity 75% or less
Increasing humidity may cause poor insulation or hasten parts deterioration. There is no need to dehumidify the environment, but avoid installing the machine in a place where it is subject to humidity.
- 3) Vibration
In operation 0.5 G or less
In transport 3.5 G or less
- 4) Ambient
Consult us where the machine is used in an environment containing much dust and dirt, or in an environment containing a high density of organic or corrosive gas on spray.

- 5) MAZATROL uses a highly reliable storage battery to keep data such as machining program, and the data is stored even when power is turned off. However, considering that battery run-down, misoperation or something unexpected may create a state where back-up is impossible, be sure to store machining program, tool data and parameter data by external data equipment, etc.

(3) Required air supply

The air blow circuits in the TOOL EYE of this machine are pneumatically operated. It is necessary, therefore, to provide an air supply as specified below.

1) Required Air Supply

Pressure 5 kg/cm² and above
Discharge 100 N-liters/min. and above
(Employ an air compressor of 0.5 HP or equivalent.)

Note: If the air should have a high content of moisture or a high temperature, it will result in damage to the pneumatic system components. It is necessary, therefore, to provide an auxiliary device, such as an air dryer or the like.

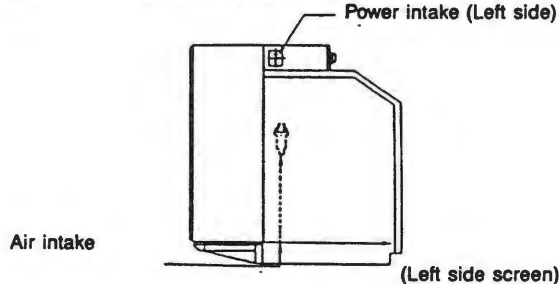
<Selection of compressor>

- 1) QUICK TURN requires a discharge pressure of 5 kg/cm² at the minimum. A compressor having an extra discharge pressure of about 2 kg/cm² is selected in general.

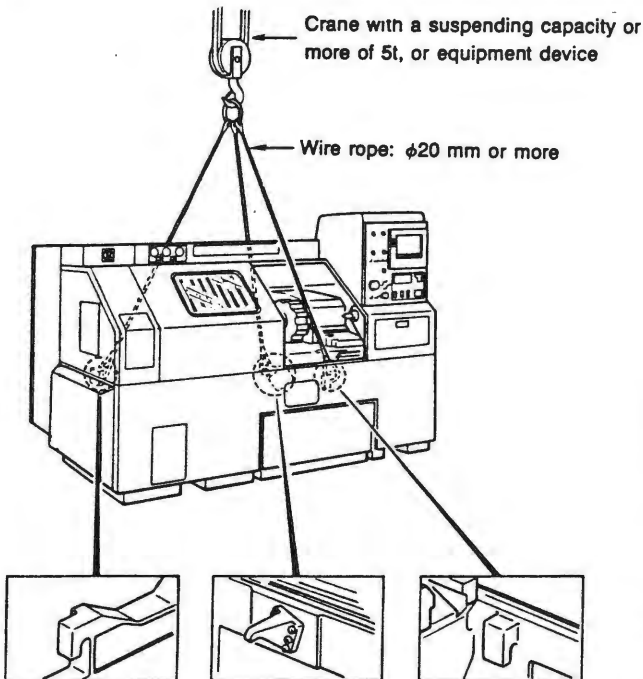
- 2) The discharge air quantity of 100 Nl/min is somewhat extra, thus permitting using an air gun or the like together.
- 3) Method of compressor operation includes "Manual unloader type", "Automatic unloader type" and "Pressure switch type". Pressure switch type suited to continuous work is good for QUICK-TURN.
- 4) The above compressor has a capacity equivalent to 1 HP (0.75 kW). Apply to a compressor manufacturer for details.

(4) Intake (power, air)

Power Top of machine left side
Air Back of electric control cabinet
Power intake (Left side)



(5) Lifting condition of machine



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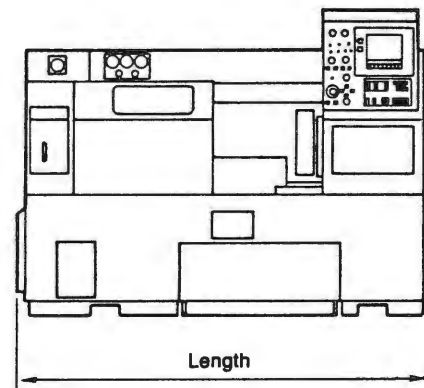
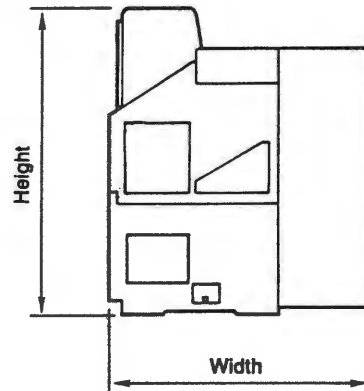
Notes:

1. It is important to balance the machine both depthwise and widthwise whenever it may be lifted. Lift the machine a little above the floor and make certain that it is well balanced.
2. Keep a lifting angle within 60°
3. Whenever the machine may be lifted by two or more persons jointly, "signs" should be given to one another to carry out lifting.

(6) General view in machine move-in, width, height, length

Entrance has to be spacious enough to meet the dimensions shown below.

(Note: Entrance dimensions are increased depending on the method of machine move-in.)



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		Width	Height	Length
Universal	mm	1,530	1,790	2,458
	inch	60.24	70.47	96.77

1-3-4 How to install

For machine tools, method of installation will have a great effect on the machine function. If any machine with accurately finished guideways is poor in installation, will not be able to attain the original object. You may have had difficulty in giving the desired machining accuracy. Most of the causes will result in the matter of installation.

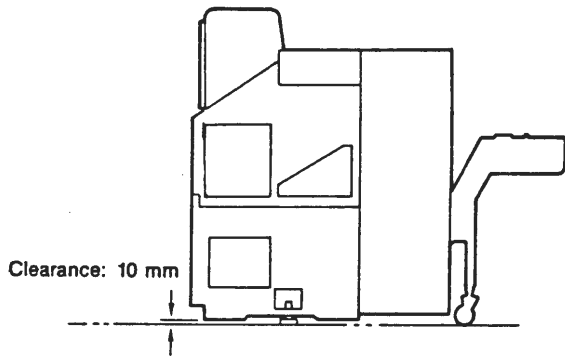
High precision machining may be performed by installing the machine in the same condition as it was assembled after reading the installation procedure carefully.

(1) Installation and maintenance

1) Foundation

To install the machine, select a flat location. First of all, arrange the environments noted in chapter 1-3-3. For installing space, refer to foundation drawing.

Floor space needs to include maintenance area in addition to machine projected area to provide the machine with maintenance service as shown in the foundation drawing.



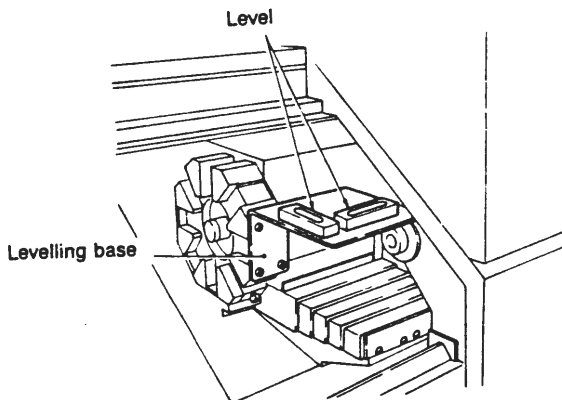
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Note: When the clearance between the lower surface of the machine and the floor surface is set at 10mm (0.39 inch), the clearance between the bed and the chip pan should be set at 10mm (0.39 inch).

5) Final centering and adjustment

Once the mortar has cured, use levelling bolts to carry out levelling all over again. Place a level dial as illustrated in the "Tentative Centering and Adjustment." For levelling procedure and tolerances involved, see the accuracy chart attached to every machine.

Note: In horizontally centering definitively, the machine should be leveled, with anchor bolts and leveling nuts securely tightened. Employ a level with a minimum scale division of 0.02 mm (0.00078 inch)



6) Maintenance of installation and inter-equipment connections

To maintain the machine accuracy for a long period and to operate the machine in its best working conditions normally, it is necessary to take proper care of the machine. A careful observation of its operating conditions, a periodic inspection and an early replacement of parts worn out would prevent the machine from unexpectedly failing.

a) Maintenance in initial stages of installation

In initial stage after installing the machine, the bed has its level vary remarkably on account of a change in foundation ground, an unstable cure of foundation, etc. These will significantly affect the machine accuracy. On the other hand, the machine is liable to be considerably stained in the interior due to the initial wear, etc. Thus, the

machine is apt to induce an accident.

To operate the machine, therefore, it is necessary to pay utmost attention.

Described below are the precautions to be taken in relation to the maintenance in initial stages of the installation.

① Run-in

Before putting the machine into operation initially after installation, use utmost care to run it in.

Allow approximately 100 hours for the run-in. Avoid applying a large load to the machine throughout the run-in.

② Checking the bed for level in initial stages

For a period of six months after installation, check the bed for level and the foundation for a possible change in situation at least once a month. Should any abnormality be found, correct it and strive to normally keep the bed at the correct level.

③ After expiration of the initial six months, prolong the checkout period properly according to a change in situation. Once such changes have stabilized at a certain level, conduct periodic inspections once or twice a year.

b) Checking inter-equipment connections

Check the NC unit, machine body, hydraulic unit, control panel and others to make certain that they are properly connected electrically to one another.

① Connectors possibly loose

Cannon connectors are employed to electrically connect units to one another. Check every connection for possible looseness and retighten it, if necessary.

② Terminal screws possibly loose

Check screws for possible looseness at electrical equipment terminals in machine interfaces and on operation panels. And retighten them, as required.

③ Check microswitch terminal screws and mounting screws for possible looseness. And retighten them, whenever necessary.

c) Checking the electrical panel

Before checking the electrical panel, do not fail to switch off the machine. Then, check every part.

① Terminal screws and soldered parts

Check terminal screws on each electrical equipment and retighten them, if necessary. Lightly pull soldered portions on the relay panel by hand to check soldering for strength.

② Plug type fuses

Check the fuse cap for possible looseness and tighten it fully.

③ Spark killer

Check each spark killer. If the case is discolored, replace it.

④ Cleaning

Dust and chips or the like, if any, inside the electrical panel would lead to an accident. Sweep them away with care, accordingly.

⑤ The air filter may be found stained blackishly. If so, tightly flush the filter with water.

2-2 Developing the Specification

2-1-2 Developping the specification QT 18N

Quick Turn 18N is available in a plenty of variations besides the standard type. For example, a model is especially designed to increase the productivity and another is equipped with the special accessories compatible with factory automation equipment (FA). Thus, Quick Turn 18N will need a wide diversity of requirements on the customers' part. Before reading this manual and other instructions, you are requested, first of all, to make certain what the machine delivered to you is.

(1) Developed specification drawing

— : Standard Spec. — : Special Spec.

Model	Spindle motor	Spindle speed torque	Turret and chuck	Spindle/Edge shape Hole diameter	Spindle bearing	Tailstock Diameter/Taper	Distance between centers	Main specification
Unit	KW (30 min.)	RPM	Hollow type	mm		mm	mm	mm (inch)
QUICK TURN 18N (341)	AC. 15	36 ~ 3600	8D/8P & $\phi 10"$ 8D/16P & $\phi 10"$	A ₂ —8" $\phi 80$	NN + Angular + NN	Turning* center $\phi 80$ /MT. No.4 Turning* center $\phi 80$ /MT. No.5	500U 500C	1) Swing on carriage wing: $\phi 440$ ($\phi 17$) 2) Maximum machining diameter: $\phi 10"$ chuck $\phi 254$ ($\phi 10$) 3) Standard machining diameter: $\phi 150$ ($\phi 6$) 4) Outer diameter cutting tool: □ 25 x □ 150 (□ 1 x □ 6) ① 8D: Right hand ② 12D: Left hand 5) Inner diameter cutting tool: Maximum: $\phi 40$ ($\phi 1\frac{1}{2}$)

Notes

1: *: There are manual and full automatic types (Standard: Automatic)

2: 8D ~ Octagonal turret 12D ~ Dodecagonal turret P ~ Indexing position

(2) Special accessories compatible with FA (For factory automation equipment)

1) Compatible with factory automation

- Robot System FLEX-100
- Bar Feeder System
- Automatic Parts Catcher
- Automatic Door Opener/Closer
- Automatic Chuck Opener/Closer
- Chuck Air Blast
- Motor Position Orient
- Automatic Power Circuit Breaker
- End-of-Machining Alarm Buzzer
- End-of-Machining Pilot Lamp
- Automatic Warmup Timer
- Quick Change Chuck
- Quick Change Tool Holder
- Microdisk
- MAZAK Cam System
- DNC Link

2) Compatible with high accuracy

- X-Axis Linear Scale Feedback System
- Coolant Temperature Control System

3) Safety measures

- Front Door Interlock
- Overload Detecting Unit
- Earth Leakage Circuit Breaker
- Hydraulic Pressure Warranty Interlock

4) Chip/Coolant Unit

- Chip Conveyor
- Powerfull Coolant
- Chip Bucket
- Floor Oil Pan

5) Miscellaneous

- Various Types of Power Chucks
- Various Types of Tool Sockets/Holders
- Spare Turrets

ITEM			UNIT	STANDARD	FOR FACTORY AUTOMATION EQUIP.			
				UNIVERSAL 8D+8" CHUCK	UNIVERSAL 12D+8" CHUCK		UNIVERSAL 8D 16-INDEX+8" CHUCK	
Z-axis	Moving stroke (*1)		mm	510				
			inch	$\phi 20 \cdot \frac{1}{8}$				
	Rapid feedrate		mm/min	30000				
			inch/min	1181				
Spindle	Spindle speed		mm ⁻¹ (rpm)	45 ~ 4500				
	Number of spindle speed ranges		stage	1				
			step					
	Spindle end		ISO A2-6					
	Pierced spindle hole diameter		mm	$\phi 62$				
			inch	$\phi 2.44$				
	Spindle bearing inside diameter		mm	front side $\phi 100$		rear side $\phi 90$		
			inch	front side $\phi 3.94$		rear side $\phi 3.54$		
	Spindle hole taper		mm	$\phi 70 \cdot \frac{1}{20}$				
			inch	$\phi 2.76 \cdot \frac{1}{20}$				
	Spindle speed range/spindle torque (spindle motor: AC20HP) (*2)		rpm/kgm	45 ~ 510/28.6				
			lbs/ft	206.86				
	Spindle speeds shiftable		automatic input	Direct command every 1 rpm (circumferential speed constantly controllable)				
			manual input					
Turret	Number of turrets		1					
	Type of turret		Octagonal	Dodecagonal		Octagonal 16-Indexing		
	Number of tools mounted on turret		piece	8	12		16	
			piece					
	Angular cutting tool shank height (*3)		mm	25				
			inch	1				
	Boring bar shank diameter		mm	$\phi 40$				
			inch	$\phi 1 \cdot \frac{1}{2}$				
	Turret indexing time		1 step	0.48				
			full step	0.85				
	Turret clamping force		kg	4300				
			lbs	94000				

*1: Stroke between -Z.O.T and +Z.O.T

*2: Wide speed range and constant output type

*3: Standard tool size: $\square 25 \times \ell 150$ ($\square 1 \times \ell 6$) Right hand

ITEM			UNIT	STANDARD	FOR FACTORY AUTOMATION EQUIP.			
				UNIVERSAL 8D+8" CHUCK	UNIVERSAL 12D+8" CHUCK		UNIVERSAL 8D 16-INDEX+8" CHUCK	
Power requirements	Electric power		KVA	41.3				
	Air pressure source	Pressure	Mpa (kgf/cm²)	0.5 (5)				
		Flow rate	Nt/min	100				
			Ngal/min.	26				
Tank capacity	Hydraulic unit tank capacity		ℓ	40				
			gal	10				
	Lubricant tank capacity		ℓ	1.8				
			gal	0.47				
	Coolant tank capacity		ℓ	200				
			gal	50				
Machine size	Machine height (*1)		mm	1790				
			inch	70.47				
	Floor space required (width × length)		mm	2360 × 2570				
			inch	92.91 × 101.18				
	Machine weight (Including the NC unit) (500C/500U)		kg	4300				
			lbs	9600				
Bed	Shape of bed			Horizontal				
	Bed width (*2)		mm	340				
			inch	13.386				
Accuracy	Positioning accuracy	X-axis	mm	0.008				
			inch	0.0003				
		Z-axis	mm	0.013				
			inch	0.0005				
	Repetitive positioning accuracy	X-axis	mm	± 0.002				
			inch	± 0.00008				
		Z-axis	mm	± 0.003				
			inch	± 0.00012				
	Turret indexing repetitive accuracy	X-axis	mm					
			inch					
		Z-axis	mm					
			inch					
Spindle Indexing accuracy			degree					
Spindle indexing repetitive accuracy			degree					

*1: A height from the bottom of machine to the operation panel

*2: An inter-center distance, linear guide locations

ITEM			UNIT	STANDARD				
						UNIVERSAL 8D 8D + 10" CHUCK		UNIVERSAL 8D 16- INDEX + 10" CHUCK
Z-axis	Moving stroke (*1)		mm	510				
			inch	$\phi 20 \cdot \frac{1}{8}$				
	Rapid feedrate		mm/min	30000				
			Inch/min	1181				
Spindle	Spindle speed		mm ⁻¹ (rpm)	36 ~ 3600				
	Number of spindle speed ranges		stage	1				
			step					
	Spindle end			JIS A2-8				
	Pierced spindle hole diameter		mm	$\phi 80$				
			inch	$\phi 3.15$				
	Spindle bearing inside diameter		mm	front side $\phi 120$		rear side $\phi 100$		
			inch	front side $\phi 4.72$		rear side $\phi 3.94$		
	Spindle hole taper		mm	AST No. 350 ($\phi 88.9$ & taper $1/16$)				
			inch	$\phi 3.5 \cdot \frac{1}{16}$				
	Spindle speed range/spindle torque (spindle motor: AC20HP) (*2)		rpm/kgm	36 ~ 408/35.8				
			lbs/ft	258.94				
	Spindle speeds shiftable		automatic Input	Direct command every 1 rpm (circumferential speed constantly controllable)				
			manual Input					
Turret		Number of turrets	1					
		Type of turret			Octagonal		Octagonal 16-Indexing	
Number of tools mounted on turret		piece			8		16	
		piece						
Angular cutting tool shank height (*3)		mm	25					
		inch	1					
Boring bar shank diameter		mm	$\phi 40$					
		inch	$\phi 1 \cdot \frac{1}{2}$					
Turret indexing time		1 step	Minimum sec.	0.48				
		full step		0.85				
Turret clamping force		kg	4300					
		lbs	94000					

*1: Stroke between - Z.O.T and + Z.O.T

*2: Wide speed range and constant output type

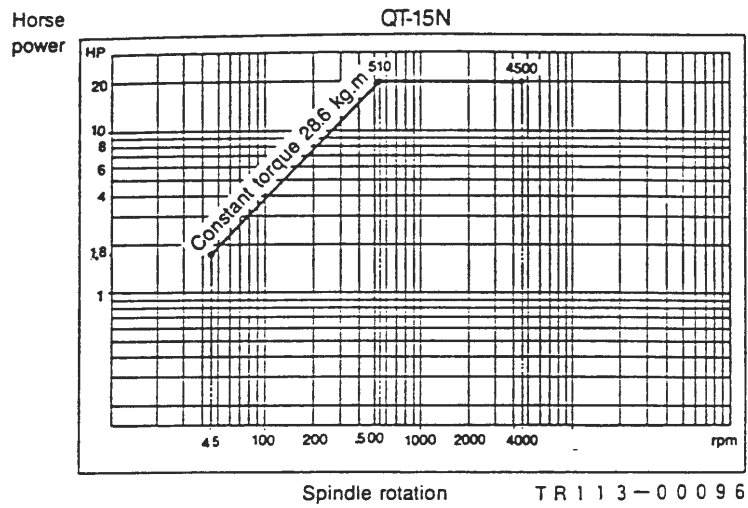
*3: Standard tool size: □ 25 × ℓ150 (□ 1 × ℓ6) Right hand

ITEM			UNIT	STANDARD				
						UNIVERSAL 8D 8D + 10" CHUCK		UNIVERSAL 8D 16- INDEX + 10" CHUCK
Power requirements	Electric power		KVA	41.3				
	Air pressure source	Pressure	Mpa (kgf/cm²)	0.5 (5)				
		Flow rate	Nl/min	100				
			Ngal/min.	26				
Tank capacity	Hydraulic unit tank capacity		ℓ	40				
			gal	10				
	Lubricant tank capacity		ℓ	1.8				
			gal	0.47				
	Coolant tank capacity		ℓ	200				
			gal	50				
Machine size	Machine height (*1)		mm	1790				
			inch	69.094				
	Floor space required (width × length)		mm	2,360 × 2,570				
			inch	92.91 × 101.18				
	Machine weight (including the NC unit) (500U)		kg	4400				
			lbs	9702				
Bed	Shape of bed			Horizontal				
	Bed width (*2)		mm	340				
			inch	13.386				
Accuracy	Positioning accuracy	X-axis	mm	0.008				
			inch	0.0003				
		Z-axis	mm	0.013				
			inch	0.0005				
	Repetitive positioning accuracy	X-axis	mm	± 0.002				
			inch	± 0.00008				
		Z-axis	mm	± 0.003				
			inch	± 0.00012				
	Turret indexing repetitive accuracy	X-axis	mm					
			inch					
		Z-axis	mm					
			inch					
Spindle indexing accuracy			degree					
Spindle indexing repetitive accuracy			degree					

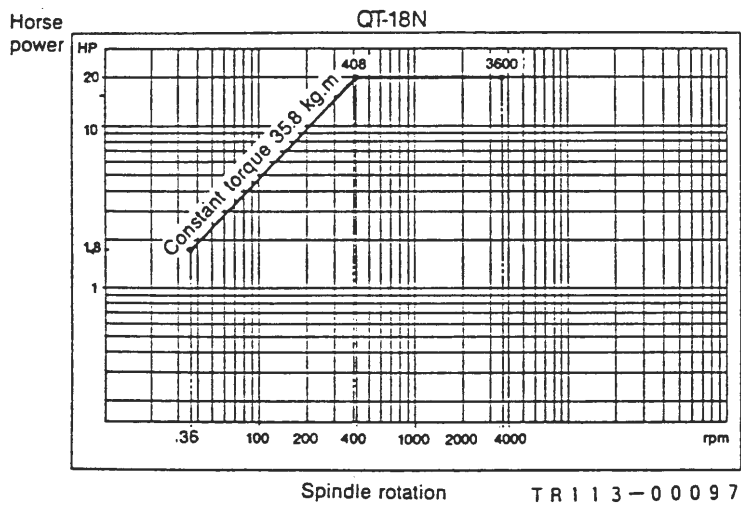
*1: A height from the bottom of machine to the operation panel

*2: An inter-center distance, linear guide locations

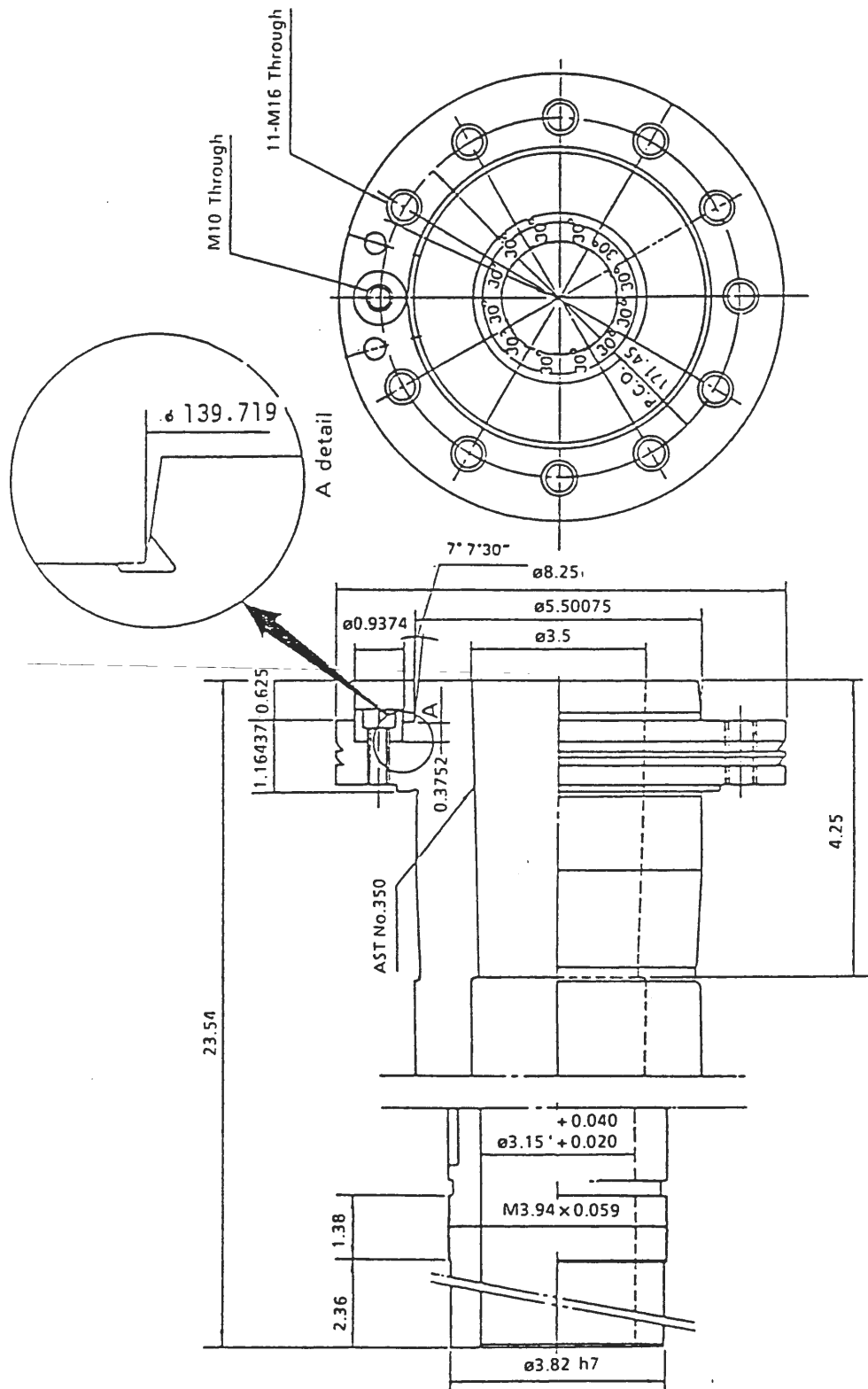
- Spindle horse power/speed
Speed range: 45 – 4500 rpm
Horse power: AC20 (30 minutes' rating) power UP type



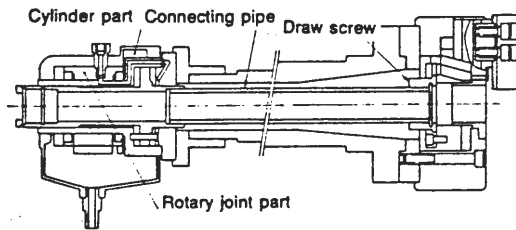
- Speed range: 36 – 3600 rpm
Horse power: AC20 (30 minutes' rating) power UP type



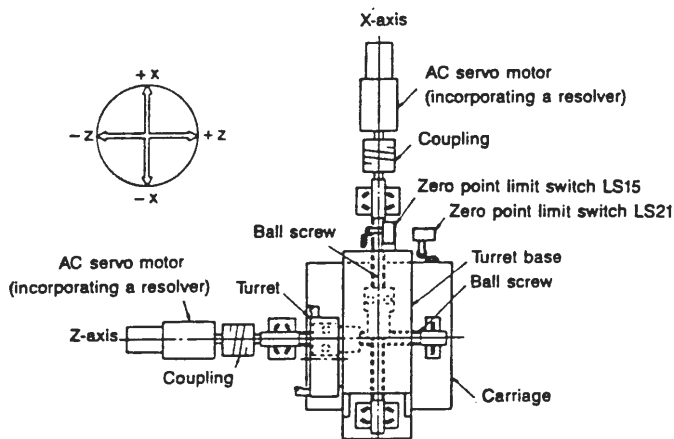
Inch system



- * Standard machines use a solid chuck as shown above, while they may use a hollow chuck to be able to meet bar work as shown below.



3-2-3 X-axis and Z-axis



The carriage is driven by Z-axis servo motor through ball screw, and slides along the bed in Z-axis direction. A turret loaded on the carriage is driven by X-axis servo motor through ball screw, and slides along the carriage in X-axis direction. An encoder for position detection on the turret is directly coupled to the motor.

- * To give higher precision positioning, a machine equipped with linear scale uses a magnetic scale in place of encoder of a rotary detector, and the linear scales directly detects linear motion in X-axis direction of the turret.

Resetting to origin (zero point)

(1) Principle of resetting to zero point

Within the shift range of turret there is a reference position of turret called Machine Origin. The NC unit establishes a machine coordinate system having this machine origin as the reference point, and the unit performs the shifting position control of the turret. This machine is provided with absolute position detecting system which store the memory of machine coordinate system in case of cutting off the power.

In the case where the machine has been left unused for a period of one month without supplying the power, the battery might have lose the memory of zero point position due to its discharge. Therefore, carry out a **Home Position Resetting Operation** prior to automatic operation so as to let the NC unit memorize the zero point position again.

When the battery has discharged, drive alarm is indicated on the **COMMAND/POSITION** display on the control panel CRT,

and **BATTERY MALFUNCTION** is indicated on the **DIAGNOSIS** display.

Each display is given on the CRT screen as the flow chart above shows. Battery charging is automatically carried out in one day after the power is supplied to the machine.

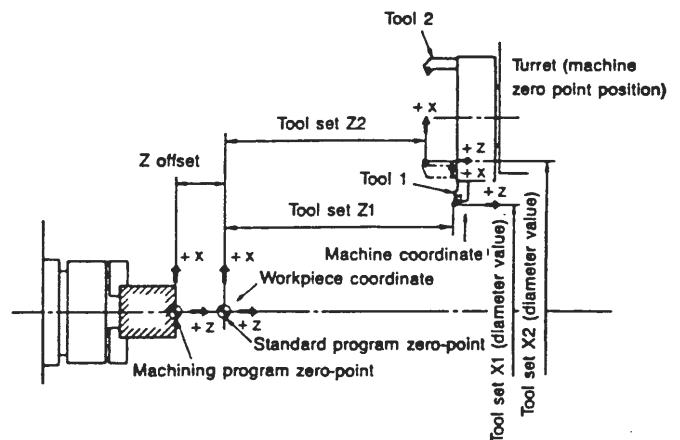
When machine zero point position is get out of place because of changing index etc, reset it at the right position.

(2) Tool set

Machine coordinate system setting machine zero point to a reference point is inconvenient for a man to handle in programming, etc., Therefore, performing "tool set measuring operation", "work coordinate system" having a reference point on spindle center line is set. Reference point of work coordinate system at this stage is referred to as "reference program origin". Tool set measuring operation is an operation to enter in NC unit the distance from each tool tip point at machine zero point position to reference program origin set on spindle center line (tool set X, Z), and it can easily be performed using a tool eye.

(3) Z offset

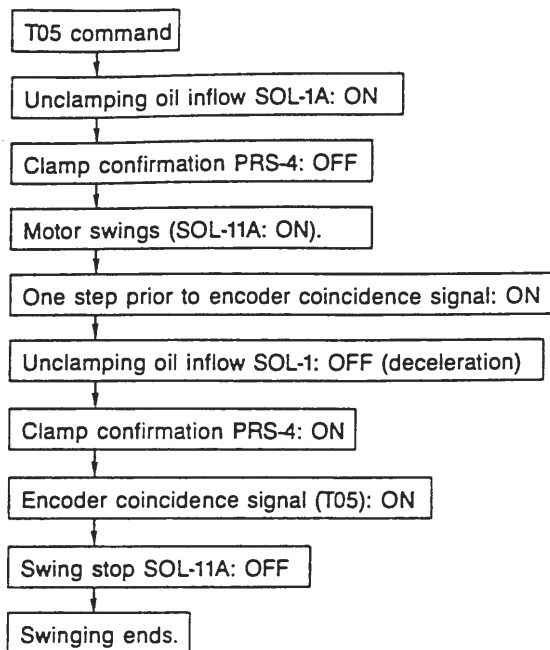
In actual programming the right end face of workpiece finished is set to the reference point, which is referred to as "machining program origin". Z offset means the distance between reference program origin and machining program origin. By entering the value in NC unit by "Z offset tip storage operation", a reference point of work coordinate system is moved from reference program origin to machining program origin.



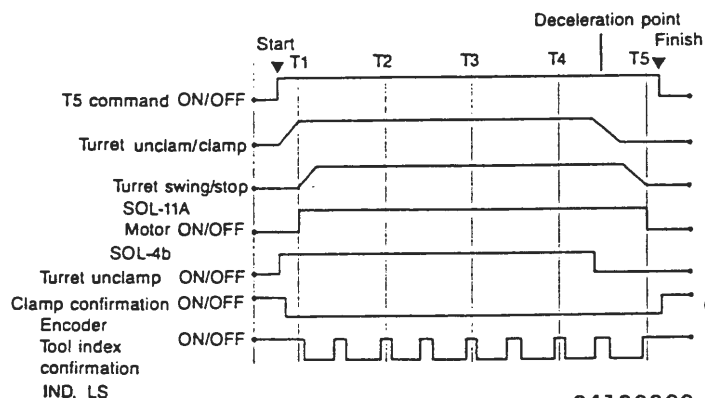
34724001

(1) Octagonal turret

1) Flow chart



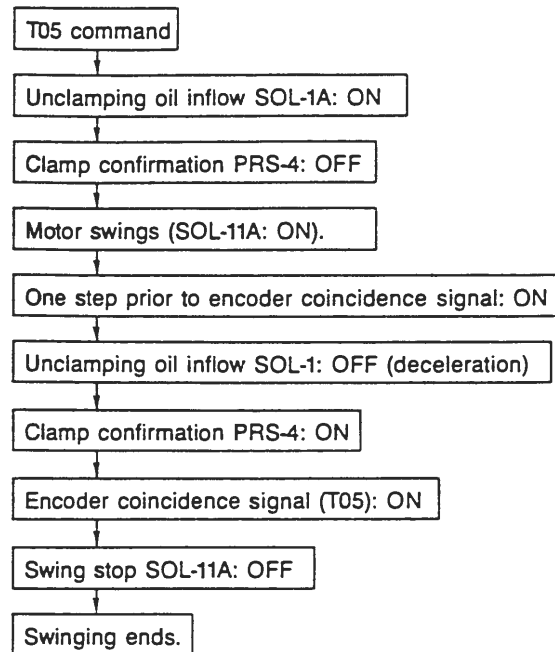
2) Timing chart



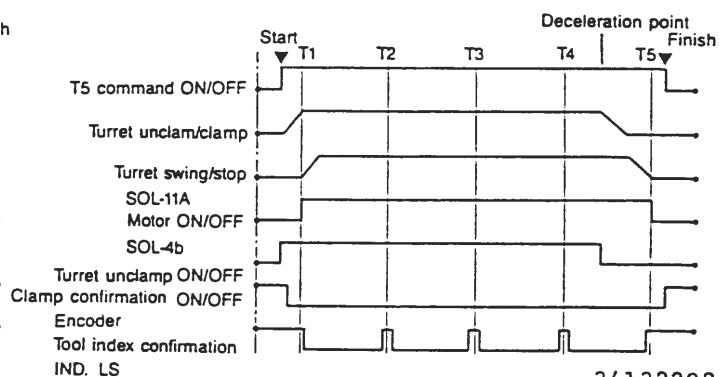
34132322

(2) Octagonal 16 indexing, dodecagonal turret

1) Flow chart



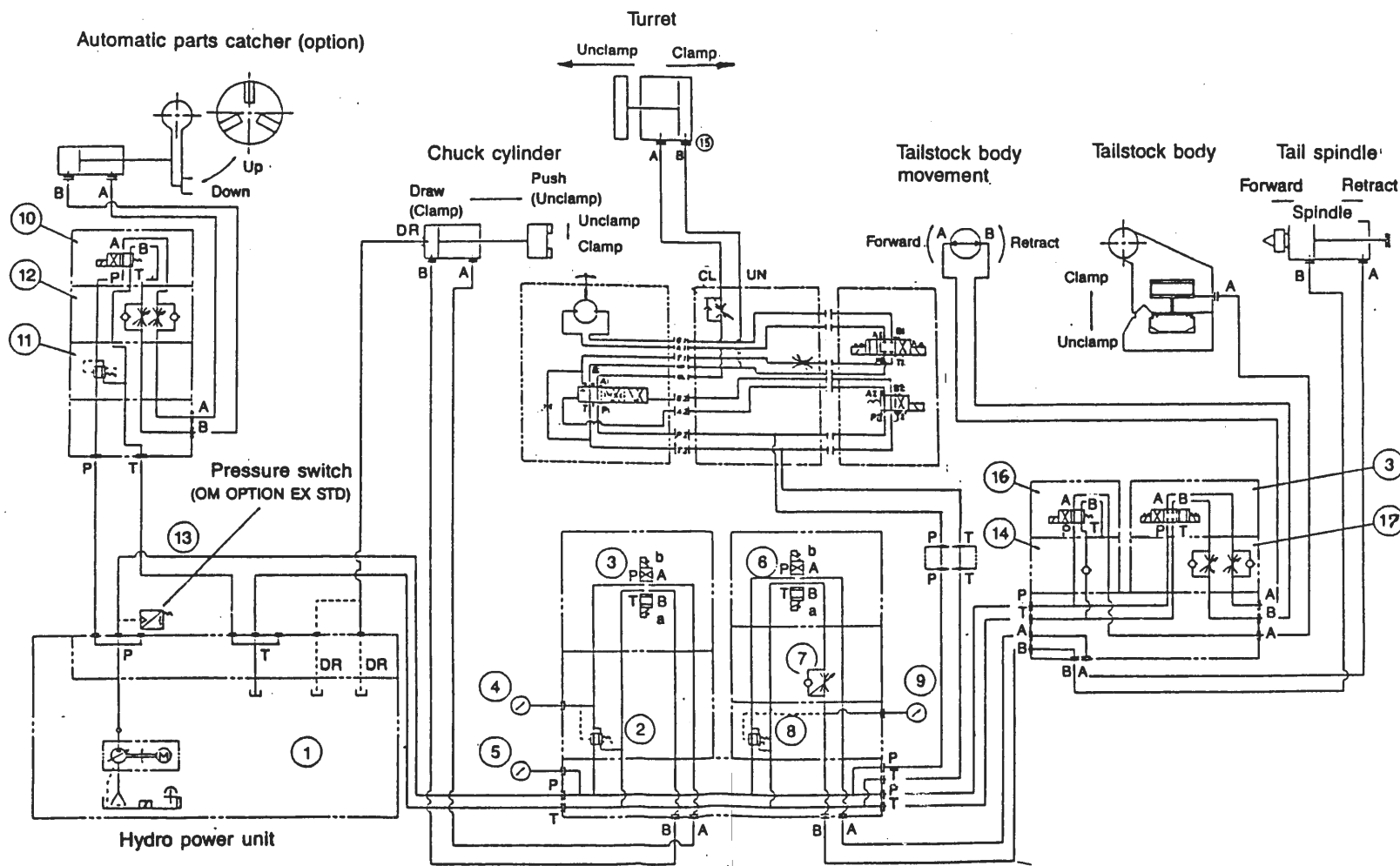
2) Timing chart



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Hydraulic circuit diagram (Universal)
(2) Octagonal, dodecagonal drum turret with full automatic tail (Standard)

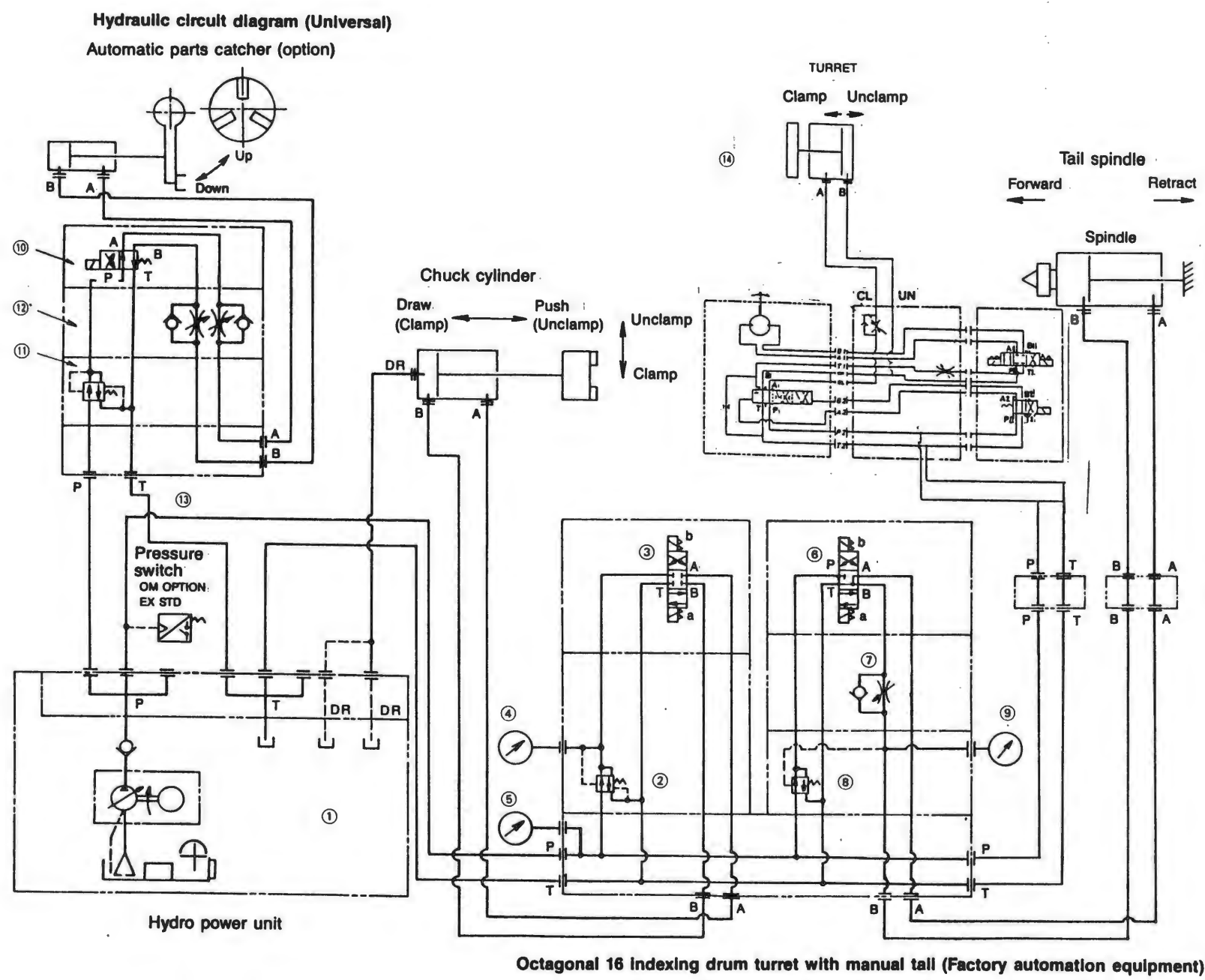
Hydraulic circuit diagram (Universal)



Octagonal, dodecagonal drum turret with full automatic tail (Standard)

No. 1341H CD0020

Hydraulic circuit diagram (Universal)
(3) Octagonal, 16 indexing drum turret with manual tail (Factory automation equipment)



No. 1341HCD0030

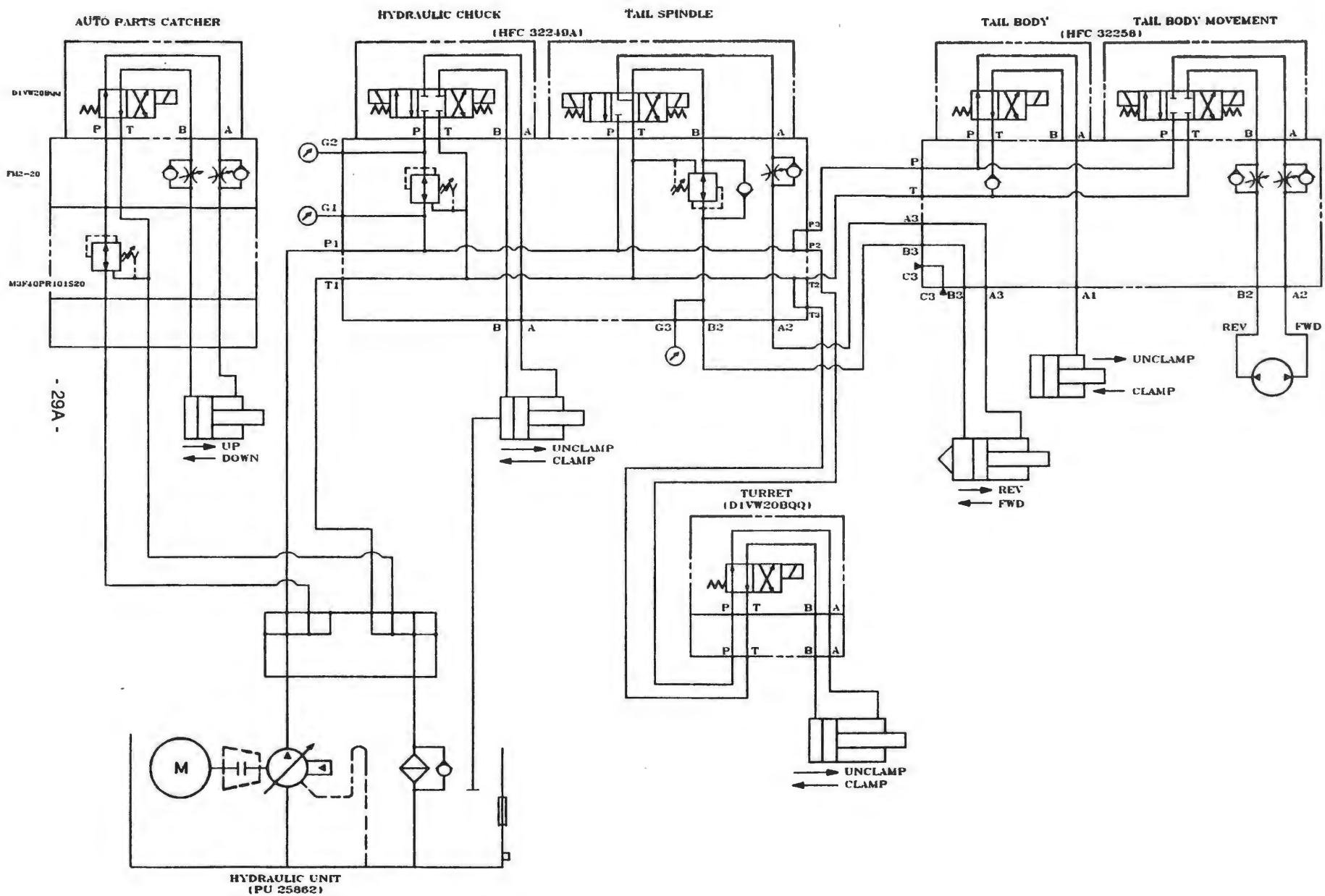
(3) Octagonal, 16 indexing drum turret with manual tail (Factory automation equipment)

No	Parts No	Parts name	Material	Q'ty	Remarks
1	G49ZZ005781	Hydro power unit	RACINE	1	B922251
2	G11ZZ001520	Reducing valve	RACINE	1	ME3P-01-A-301B
3	G16ZZ003390	Solenoid valve	RACINE	2	OD4-DSHS-101SH-J13-A100
4	41415220220	Pressure gauge	ASAHI KEIKI	1	Chucking pressure
5	41936034380	Pressure gauge	ASAHI KEIKI	1	Main pressure
6	G16ZZ003400	Solenoid valve	RACINE	1	OD4-DSHS-701SH-J13-A100
7	G17ZZ001570	Flow regulator	RACINE	1	MFHB-01-Y-30
8	G11ZZ001590	Reducing valve	RACINE	1	ME3B-01-A-301B
9	33415235750	Pressure gauge	ASAHI KEIKI	1	Tailstock thrust
10	G16FH000320	Solenoid valve	(NACHI)	2	SA-G01-A3X-C1-11
11	G11FH001200	Reducing valve	(NACHI)	1	OG-G01-P1-20
12	G17FH001160	Flow regulator	(NACHI)	1	OCY-G01-W-Y-20
13	G23AM000640	Pressure switch	ASIA KOGYO	1	176-112-800
14	G10ZZ001601	Index motor	G-ROTA	1	HMI-070-4FN-3AM0-L0-US-47

(4) Octagonal, 16 indexing drum turret with full automatic tail (Factory automation equipment)

No	Parts No	Parts name	Material	Q'ty	Remarks
1	G49ZZ005781	Hydro power unit	RACINE	1	B922251
2	G11ZZ001520	Reducing valve	RACINE	1	ME3P-01-A-301B
3	G16ZZ003390	Solenoid valve	RACINE	2	OD4-DSHS-101SH-J13-A100
4	41415220220	Pressure gauge	ASAHI KEIKI	1	Chucking pressure
5	41936034380	Pressure gauge	ASAHI KEIKI	1	Main pressure
6	G16ZZ003400	Solenoid valve	RACINE	1	OD4-DSHS-701SH-J13-A100
7	G17ZZ001570	Flow regulator	RACINE	1	MFHB-01-Y-30
8	G11ZZ001590	Reducing valve	RACINE	1	ME3B-01-A-301B
9	33415235750	Pressure gauge	ASAHI KEIKI	1	Tailstock thrust
10	G16FH000320	Solenoid valve	(NACHI)	2	SA-G01-A3X-C1-11
11	G11FH001200	Reducing valve	(NACHI)	1	OG-G01-P1-20
12	G17FH001160	Flow regulator	(NACHI)	1	OCY-G01-W-Y-20
13	G23AM000640	Pressure switch	ASIA KOGYO	1	176-112-800
14	G14ZZ001580	Check valve	RACINE	1	MBXT-01-0-30
15	G10ZZ001601	Index motor	G-ROTA	1	HMI-070-4FN-3AM0-L0-US-47
16	G16ZZ003360	Solenoid valve	RACINE	1	OD4-DTHS-101SH-J13-A100
17	G17ZZ001430	Flow regulator	RACINE	1	MFHW-01-X-30A1

Hydraulic Circuit for Machine with 8D Tool Turret (old style)
(Parker Hannifin Hydraulics)



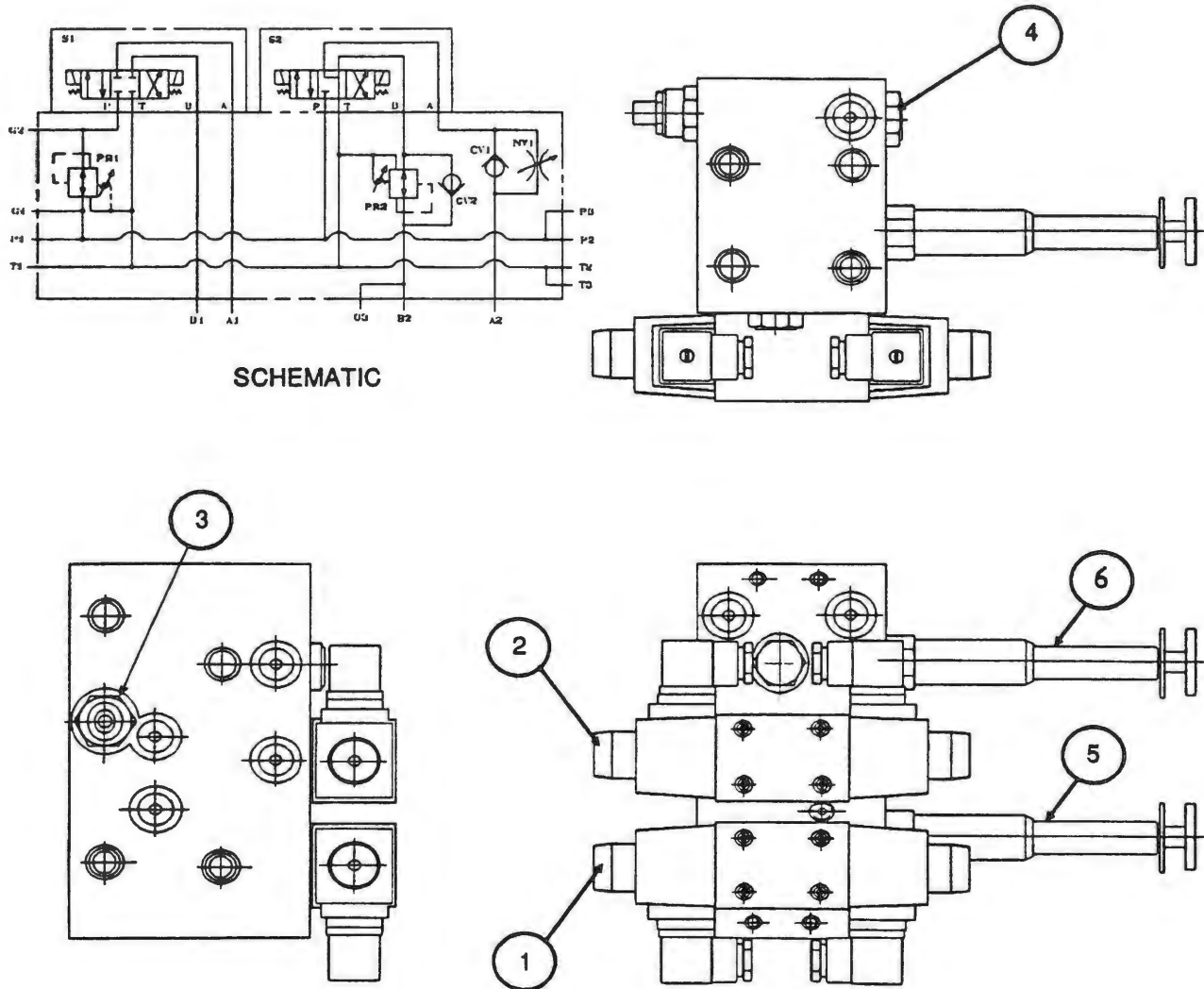
Mazak

Component Parts for machine with Parker Hannifin Hydraulics

8D Turret & 8D, 16 Tool Turret

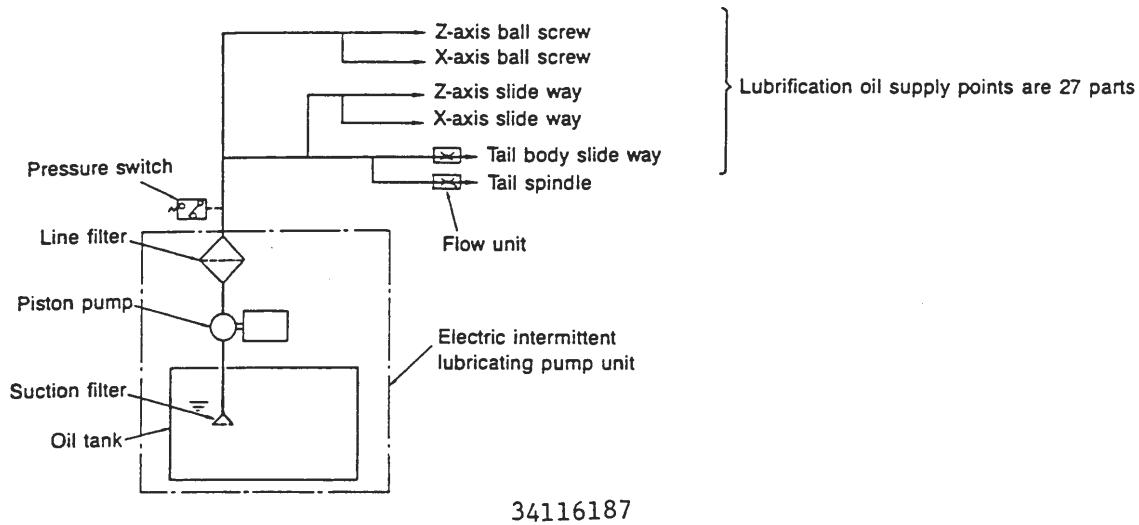
No.	Description	Qty.	Part No.
1	Hydraulic power unit	1	G49MPH01220
2	Reducing valve PR101K10X4421	1	G12MPH01360
3	Directional control valve D1VW1CQD	2	G16MPH01180
4	Pressure gauge-Main	1	41936034380
5	Directional control valve D1VW4CQD	1	G16MPH01190
6	Check valve CV101P	5	G14USA00020
7	Needle valve NV101S	3	G17USA00010
8	Pressure gauge-Tailstock	1	33415235750
9	Directional control valve D1VW20BQD	1	G16MPH01200
10	Reducing valve OG-G01-P1-20 (Nachi)	1	G11FH001200
11	Flow control valve OCY-G01-W-Y-20 (Nachi)	1	G17FH001160
12	Pressure switch EIS-H500-E1	1	G23JM000270
13	Index Motor (NOP)	1	G10ZZ001602
14	Sub-Plate MSA-01X-10 (Nachi)	1	G27FH001670
15	Pressure reducing valve PR1092-K1-X4420	1	G12MPH01390
16	Directional control valve SA-G01-A3X-C1-11 (Nachi)	1	G16FH000320
17	Pressure gauge-Chuck	1	41415220220

Hydraulic chuck and tail spindle assembly manifold for machine with Parker Hannifin Hydraulics



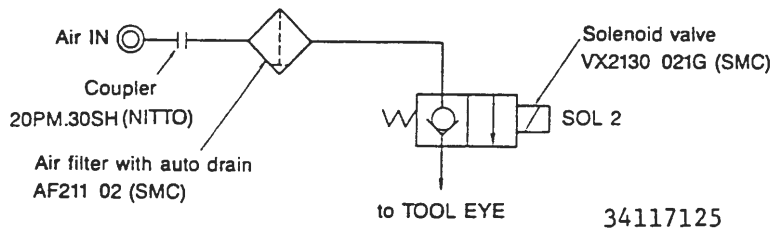
No.	Description	Qty.	Part No.
1	Directional control valve D1VW1CQD	1	G16MPH01180
2	Directional control valve D1VW4CQD	1	G16MPH01190
3	Needle valve NV101S	1	G17USA00010
4	Check valve CV101P	2	G14USA00020
5	Pressure reducing / relieving valve PR101K10X4421	1	G12MPH01360
5	Pressure reducing PR102K10X4420	1	G12MPH01390

3-2-7 Lubricating circuit



Lubricating oil is automatically supplied by electric intermittent lubricating pump unit installed on the front right side of the machine to linear guides and ball screws of X and Z-axes as well as tail stock sleeve every about seven minutes. The quantity of supplying oil to each lubricating part is kept constant by flow unit fitted to the end of the pipe. When a trouble occurs with the lubricating system and the pressure is reduced to 0.3 kg/cm² or less, the pressure switch works to display an alarm **SLIDEWAY LUBRICATION ALARM** on CRT.

3-2-8 Air circuit



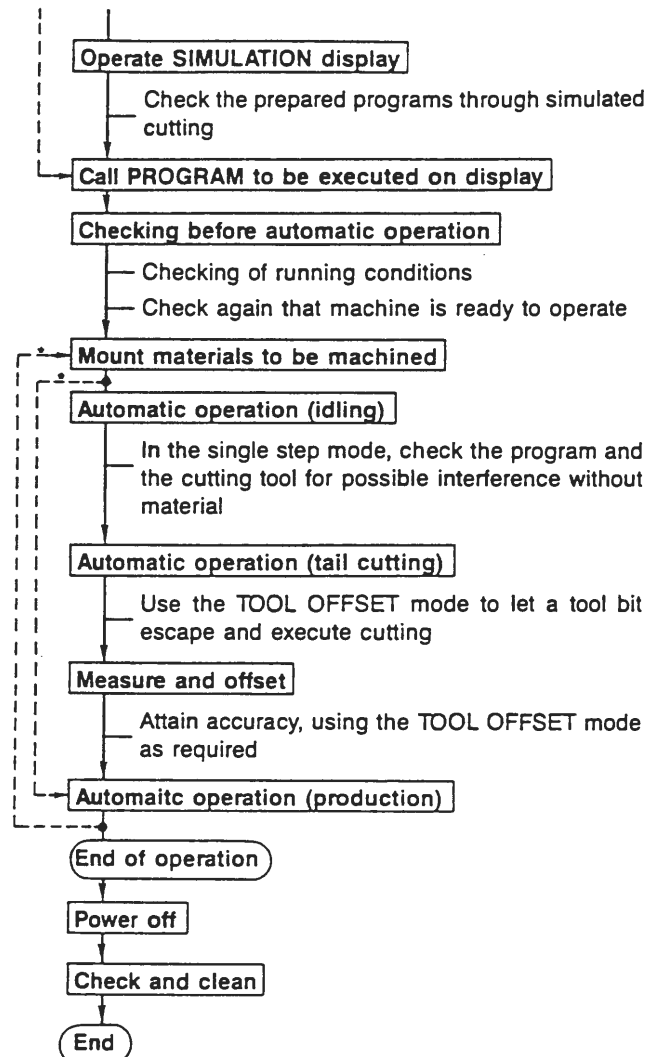
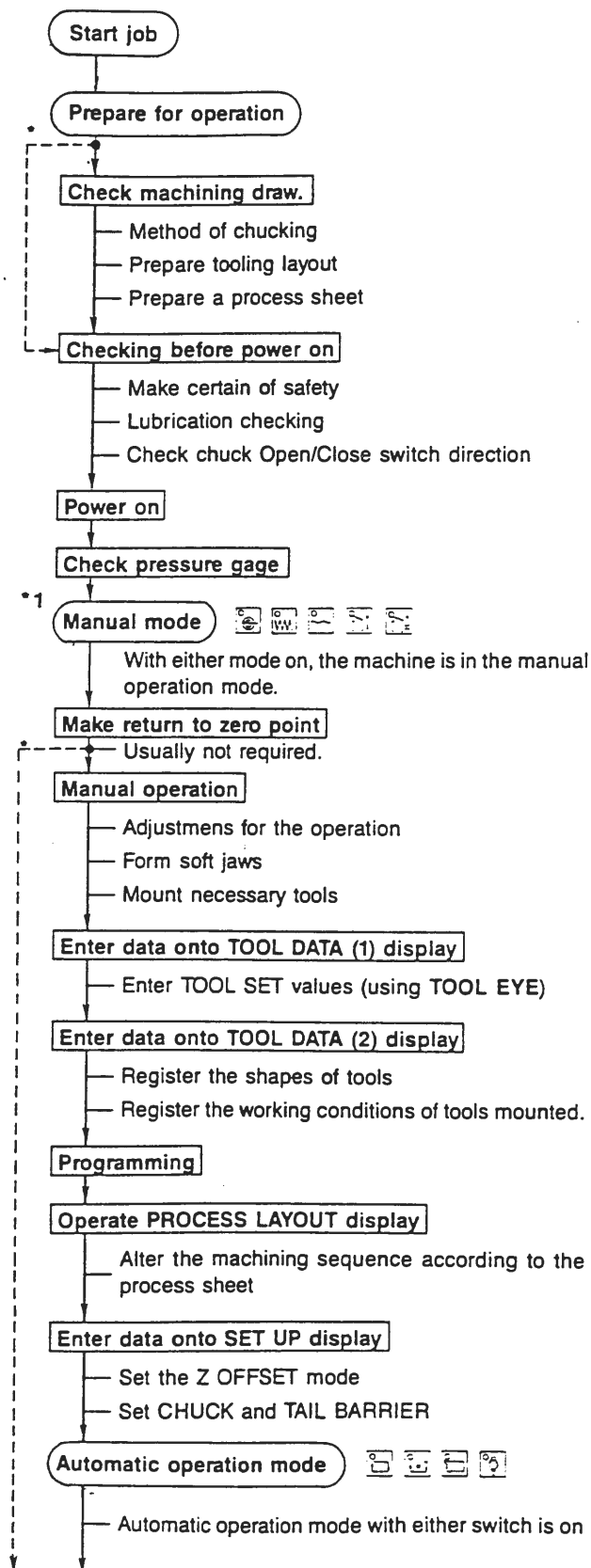
Standard machines use air for air-blast of TOOL EYE, as well as for cooling of turret and X-axis ball screw. Air solenoid valve and filter are placed inside the side cover at the headstock side.

3-3 Order List

Order list of standard specification

	Item	Model	Maker	Q'ty	Remarks
Unit	Spindle motor	B132M C132LU SJ-18.5BW4	MITSUBISHI	R02MA001780	11/15KW
	Spindle controller	FR-SF-2-11K-KP	MITSUBISHI		
	X-axis servo motor	HA83C-S	MITSUBISHI		
	Z-axis servo motor	HA103C	MITSUBISHI		
	Hydraulic unit		TOKIWA		1.5 KW
	Lubricating oil pump	MMXL-II	RUBE	G06LA001131	
	Coolant pump	VKP-072Z	FUJI		
	Chuck	N-08A0615	KITAGAWA	M10KM006260	
	Rotary hydraulic cylinder	Y1225H	KITAGAWA	M11KM002740	
	Turret swing motor				
	Turret gear head				
	Turret swing motor				
	TOOL EYE motor	4TK10GK-A	ORIENTAL	R13PJ000510	
	TOOL EYE gear head	D1009-144	ORIENTAL	R13PJ000740	
Electric parts	Spindle encoder	F3-28916	MITSUBISHI	R51MA000560	
	X-axis		MITSUBISHI	R50MA000630	
	Z-axis		MITSUBISHI	R50MA000630	
	Turret angle indicator	TS1857N16	TAMAGAWA	R52ZZ000711	For 8D Turret, Octagonal 16 indexing turret
	Turret proximity switch	FL7M-2D6G-901	YAMATAKE	R26YB000720	
	TOOL EYE sensor	D5A-0434	TATEISHI	R28TC000500	
	TOOL EYE proximity switch	FL7M-2D6-903	YAMATAKE	R26YB000980	
	Turret clamp solenoid valve	SLD-G01-A3X-C1-10	FUJIKOSHI	G16FH002750	
	Chuck open/close solenoid valve	SLD-G01-C5-C1-10	FUJIKOSHI	G16FH002800	
	Tail spindle solenoid valve	SLD-G01-C6-C1-10	FUJIKOSHI	G16FH002810	

4-2 Overall Operation Flow Chart



*) represents the case where an identical workpiece is machined continuously.

*1: Subject to the absolute value detecting system specification, the system will be put into the automatic operation mode when switched on. Therefore, it is ready for an immediate startup of automatic operation.

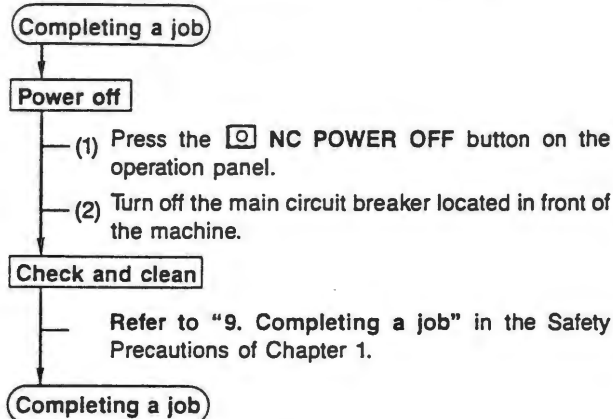
4-3 Preparations for Operation

4-3-1 Operations before starting a job

Checking before Switching on

- (1) Make certain that both operation and control panels have their respective doors closed.
- (2) Make certain that any covers (front cover, side cover and back cover) are not removed.
- (3) Check the level gages (hydraulic unit and lubrication unit) at the portions to be lubricated.
- (4) Check the coolant for its level.
- (5) Make certain, among others, that the safety precautions referred to in Chapter 1 are observed.
- (6) Select the direction in which the hydraulic chuck jaws are to be opened and closed. The OPEN/CLOSE DIRECTION selector switch located

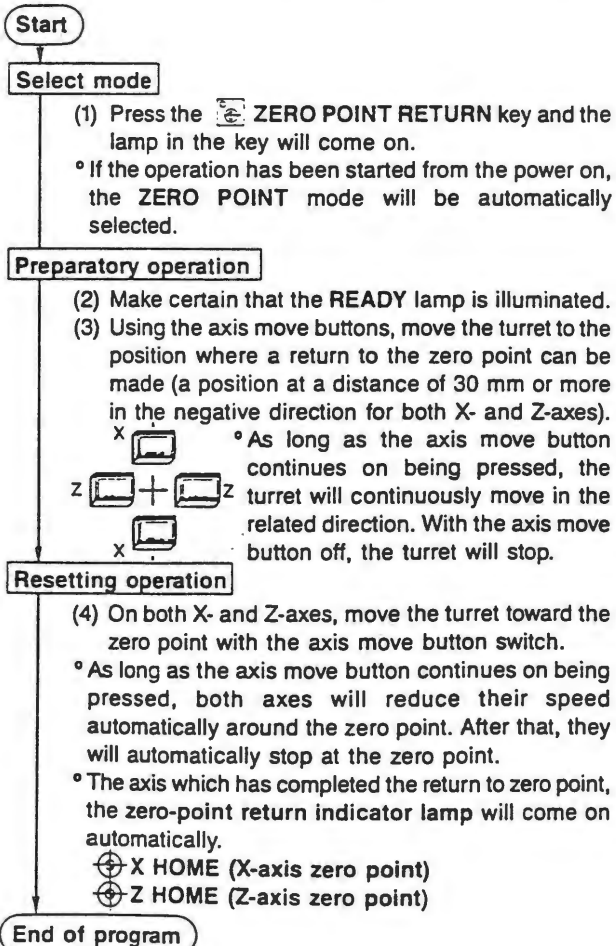
4-3-3 Operation to bring a job to the end



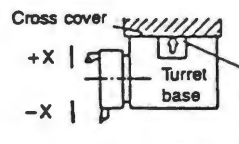
4-4 Manual Operations

4-4-1 Operation to make a return to the zero point

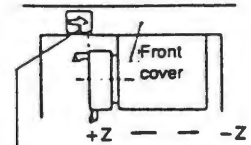
Unless the machine has not been switched on for a long period (approximately 1 month), the machine zero point once stored has been lost, with "ZERO RETURN?" displayed on the picture. In such a case, make certain that the READY lamp is illuminated. Then, proceed to the operation of returning to the zero point.



Note: The machine is provided with an arrow-marked plate as an indicator showing the zero point of the turret. It is possible, therefore, to visually know where the turret has its zero point positioned.



When the arrow mark has its top come in contact with the cross cover at the front end, the X-axis may be considered positioned nearly at the zero point.

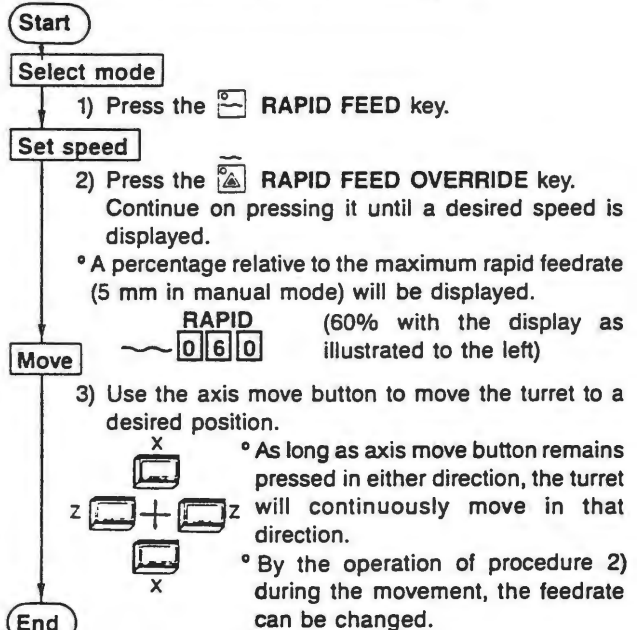


When the arrow mark has its top come in contact with the turret at the left end, the Z-axis may be considered positioned nearly at the zero point.

4-4-2 Feed

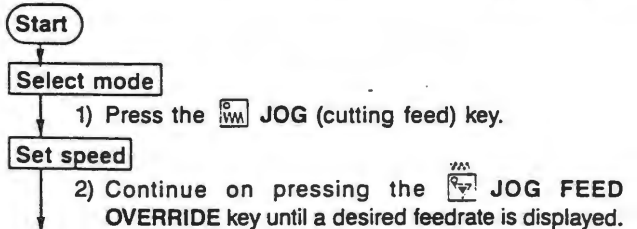
(1) Rapid feed

This function should be used to swiftly move the turret when bringing a cutting edge more closely to or remotely from a workpiece to mount a tool or to manually cut.



(2) Cutting feed

This feedrate should be used to really carry out cutting, such as standard workpiece skin cutting, machining a simple jig.



Stop

5) Press the  spindle stop button.

End

(2) Spindle inching

This function should be used to turn the spindle to the position where a job can be easily done when mounting or removing a green jaw.

Start

Manual operation mode

1) Make certain that the machine is in one of **MANUAL OPERATION** modes.

Select turning direction

2) Press the  rotational direction selector button and determine a turning direction.

Jog operation

3) As long as spindle jog-fed button  is pressed, the spindle continues to rotate, with the key took off, the spindle stops rotating.

End

4-4-4 Swinging the turret

The turret is made to swing so as to mount/remove a tool and to measure the nose position of a tool.

Start

Manual operation mode

(1) Make certain that the machine is in one of the manual operation modes.

Turning operation

(2) Continue on pressing the **TOOL SELECT** switch until a desired tool (or tool position) has reached a desired point.

TOOL SELECT ° As long as the turret is unclamped, it does not swing.

FWD ° In the manual operation mode, the turret swing direction can be selected by the **TOOL SELECT** switch.

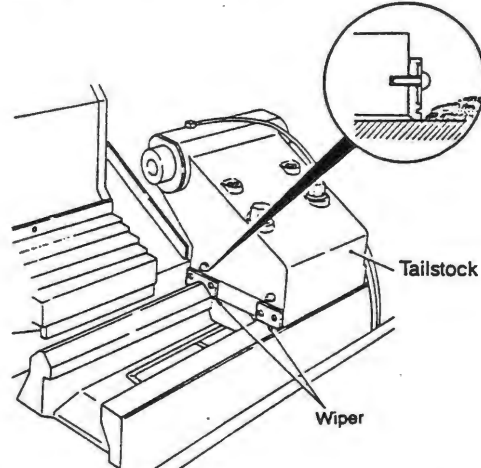


REV ° FWD: clockwise as viewed from the turret face. REV: counterclockwise as viewed from the turret face.

End

4-4-5 Moving the tailstock body

(1) Manually moving the tail body

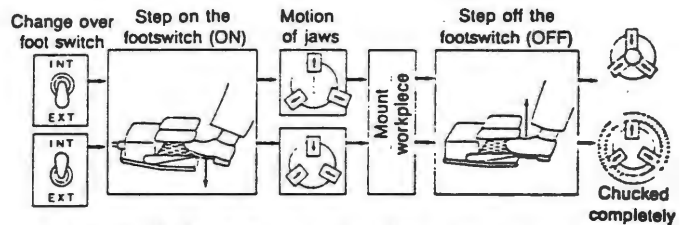


The tailstock should be fixed with two clamping bolts. To move the tailstock, loosen the two bolts and apply a lubricant over the sliding surface. After that, move the tailstock. The lubricant may be applied onto the sliding surface either directly or into the ball oiling nipple by the use of an oiler.

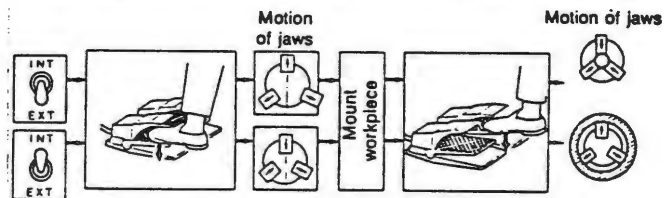
4-4-6 Operating the chuck foot switch

In the manual operation mode or in the automatic operation mode, this switch should be used to open and close the chuck jaws to mount or remove a workpiece.

(1) Single foot switch



(2) Double foot switch (once the selector switch has had its position selected, it is unnecessary to select any more as long as the type of work piece chucking is not changed.)



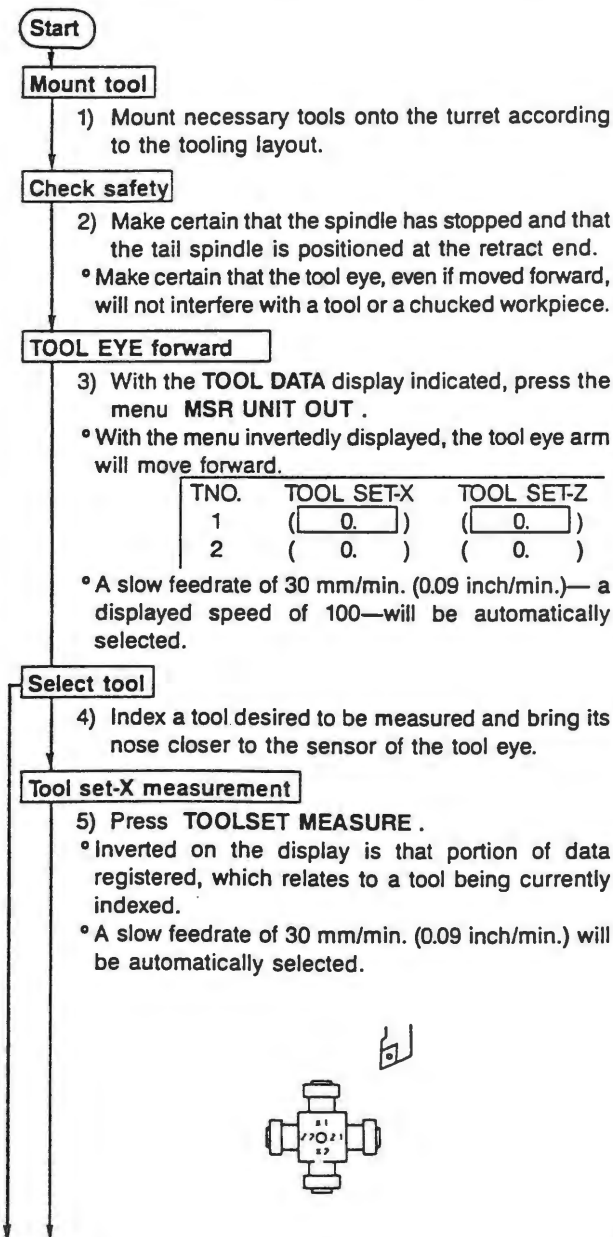
Note: While the spindle is turning, type chuck cannot be opened or closed because it has been interlocked. Do not unnecessarily step on the switch.

- Adjusting the dog for tail spindle
- a) Make advance the tail body to the position on machining workpiece keeping the spindle retracted to the backward end.
- b) Make advance the spindle and push the workpiece with spindle.
- c) Considering the difference of workpiece length, adjust the forward end dog position so that the forward end proximity switch will come across the center of dog.
- d) Set the retract end dog so that the retract end proximity switch will come to ON when the spindle reaches to cylinder stroke retract end.

4-4-9 Operations of inputting onto TOOL SET display

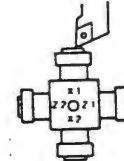
(1) TOOL SET Measurement Operation:

This operation is to register tool set values on the TOOL SET display. A position of the nose to be measured has been fixed beforehand according to the type of a tool. See the "NC Unit Instruction Manual".



- 6) Using the axis move button, feed the tool at the nose. Thus, bring it into contact with the sensor.
- The sensor will "peep" and the LED at the center will go out. And axial feeding will stop.
 - Register **TOOL SET MEASUREMENT** data on the display.

TNO.	TOOL SET-X	TOOL SET-Z
1	(-236.412)	(0.)
2	(0.)	(0.)

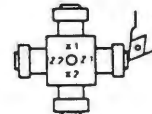


- 7) Let the nose escape out of the sensor.

Tool set-Z measurement

- 8) Carry out operations as referred to in 4) thru 7) above and register **TOOL SET Z** on the display.

TNO.	TOOL SET-X	TOOL SET-Z
1	(-236.412)	(-346.456)
2	(0.)	(0.)



- 9) Move the turret to the position where tools can be swung.

All tools end?

NO YES

- 10) Repeat Steps 4) thru 9) and register on the display the **TOOL SET** values of every tools mounted.

TOOL EYE retract

- 11) Move the turret so that the tool eye arm, even if moved backward (returned to the accommodated position), will not interfere.
- 12) Press the menu **MSR UNIT IN** and let the inverted display disappear.
- The tool eye arm will retract.

End

4-4-10 Inputting onto SET UP display

(1) Setting Z-OFFSET

- 1) Indicate the **SET UP** display and call machining workpiece No.
- 2) Fit one of the tools, which have been already **TOOL SET**, to the machining material at the right end.
- 3) Place the cursor at the **Z-OFFSET** position of the related workpiece No. (**WNO.**)
- 4) Message "**Z-OFFSET <TEACH>?**" will be indicated. Press the menu **Z-OFFSET TEACH** to invert the display.
- 5) Use numerical keys to enter a distance from the work program zero point to the end of material. Then, press the **INPUT** key.

5. INSPECTION AND MAINTENANCE

5-1 Routine inspection

Routine inspection list											
No.	Inspection spot	Inspection item	Check Remarks	/	/	/	/	/	/	/	/
1	Oil level gauge at lubricating spot	- Is the oil quantity adequate? - Isn't the oil noticeably dirty?	Replenish if inadequate.								
2	Coolant level	- Is the coolant level proper? - Isn't the coolant noticeably dirty? - Isn't the filter at the oil pan clogged?	Replenish if necessary.								
3	Slideway	- Is lubricating oil supplied adequately? - Isn't the wiper broken?									
4	Pressure guage	- Is the pressure adequate? - Is the air pressure adequate?	60 kg/cm ² 5 kg/cm ²								
5	V belt, timing belt	- Is the belt tightened properly? - Isn't the surface scratched or cracked?									
6	Piping, machine periphery	- Isn't there oil leakage? - Isn't there coolant leakage?									
7	Motor, gear box, other revolving part	- Isn't noise or vibration produced? - Isn't unusual heat is generated?									
8	Moving part	- Isn't noise or vibration produced? - Does the part work smooth and normally?									
9	Operation panel	- Does the switches and levers function properly? - Isn't an alarm shown on the display?									
10	Safety device	Does the device function properly?									
11	Cooling fan	Do the cooling fans at the control box and operation panel revolve?									
12	External wiring, cable	- Aren't they disconnected? - Isn't the covering broken?									
13	Cleaning	Cleaning of chuck surface, turret and slideway cover top, as well as chip removal	In closing work								
14	Chuck greasing	Greasing from grease nipple at the periphery of master jaws	Once a week								
15	Machined work	Is machining accuracy maintained satisfactorily?									

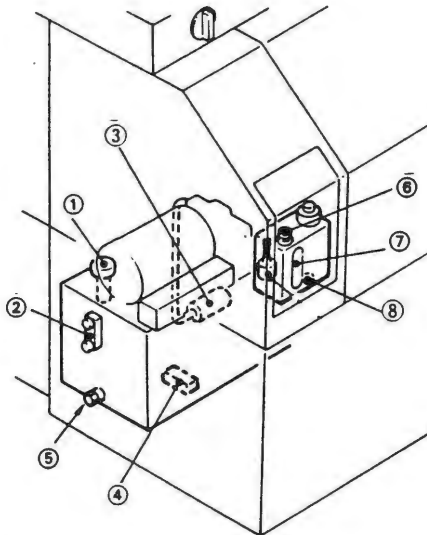
Memo:

5-3 Lubrication, Cutting Fluids

5-3-1 List of parts to be lubricated

For lubrication, apply an appropriate amount of oils specified. Whenever an oil may be supplied or changed, check the list of lubricants given in the illustration below.

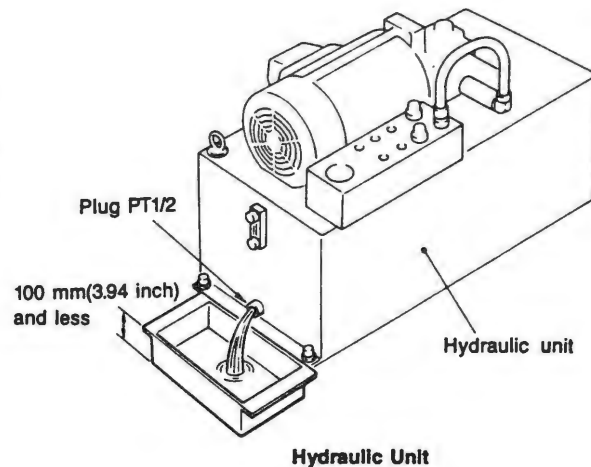
The lubrication cycles specified below are the reference values on the assumption that the machines is to operate for 8 hours a day.



No.	Part Name	Lubricating Point	Q'ty	Recommended Oil	Remarks
1	Oiling port	Hydraulic power unit	40l (10.57 gal)	D.T.E. 24 (Mobil) FBK OIL 32 (NIPPON OIL) Daphne Super Multi 32 (IDEMITSU)	Replace every 6 months at same time, clean the strainer and micro-separator.
2	Level gauge				
3	Strainer				
4	Micro-separator				
5	Oil draining port	Ball screw & slideway	1.2l (0.32 gal)	D.T.E. 21 (Mobil) FBK OIL 32 (NIPPON OIL) Daphne Super Multi 32 (IDEMITSU)	Automatic lubrication Supply as required Clean the tank every year.
6	Oiling port				
7	Level gauge				
8	Oil draining port				

5-3-2 Maintenance of hydraulic unit

The main inspection items for hydraulic unit maintenance are: Replacement and supply of hydraulic operating fluid and inspection and cleaning of strainer and microseparator.



(1) Replacement of operating fluid

Although replacement of operating fluid depends on using frequency of the machine, basically speaking, replace all the quantity in 3 months for the first time then every 6 months thereafter.

(2) Strainer cleaning

When replacing the above-mentioned operating fluid, be sure to inspect and clean the strainer. To take out the strainer from the tank, remove the suction piping.

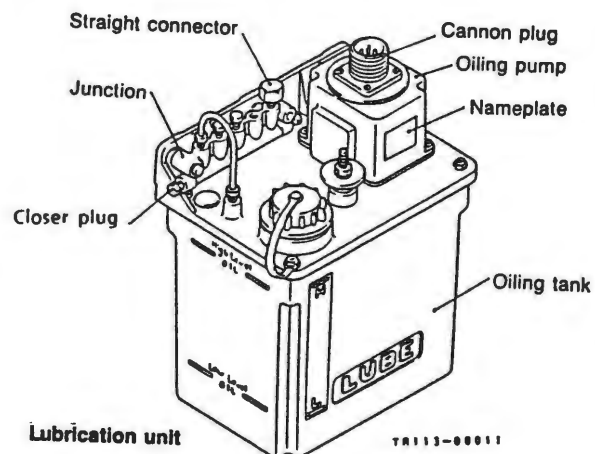
(3) Microseparator cleaning

In replacing the operating fluid, inspect and clean the microseparator attaching to the bottom plate of the tank. Take out the cover of the oil supplying port to take out the microseparator in accordance with the operation manual. In so doing, also inspect and clean the inside of the tank.

5-3-3 Maintenance of lubrication unit

The main maintenance items for the lubricating unit are:

- 1) Supply of lubricant
- 2) Filter cleaning or replacing



(1) Suction filter cleaning

Clean or replace the suction filter in the oil tank once a year. The filter comes into sight when the pump is removed from

Lubrication System Troubleshooting

Problem	Cause	Remedy
1) No oil is supplied or "LUBE PRESSURE ERROR" shows on CRT alarm screen.	°Oil level in tank low. °Motor turns in wrong direction. °Clogged suction filter. °Incorrect pump discharge amount. °Pump tubing is damaged.(bent, crushed or loose) °Viscosity is too high. °Air is in the distribution system. °Foreign substance in the system. °Check valve stuck. °Defective pressure switch or wiring.	°Add the same brand and grade of oil °Check the motor wiring °Clean or replace the filter. Change the oil. °Adjust pump discharge amount. °Tighten connections or replace tubing section. °Examine oil, replace with suitable oil. °Bleed the system of air. °Clean system and replace metering valves. °Clean or replace. °Check wiring or replace pressure switch.
2) Pressure in the main distribution tubing does not increase	°No oil is supplied for reasons above. °Pump piston O-ring damaged. °Air in oil supply tubing. °Oil leaks at tubing connections. °Damaged tubing section.	°Correct conditions as described. °Replace O-ring °Check system and operate the pump to bleed. °Tighten to or install new tubing. °Replace damaged tubing section.
3) Oil leakage	°Pump packing damaged °Pump mounting loose °Oil gauge loose or damaged °Drain plug loose	°Replace seal. °Tighten bolts. °Tighten gauge or replace. °Tighten plug.
4) Air in the system	°Oil level low. (air entered through the intake port) °Improper pipe connection at the suction block. °Pipe damaged.	°Add the same brand and grade of oil °Tighten or replace fittings. °Replace damaged pipe sections.

- 4) Loosen hexagon nut ③ and unfasten hexagon socket headed set-screw ④.

Thus, the motor base ⑤ will be freely movable up and down.

- 5) Turn upper hexagon nut ② clockwise and motor base ⑤ will go up so that the belt will be related.
- 6) Adjust upper and lower hexagon nuts ② so that the V-belt will be tensioned appropriately.
- 7) After completion of the adjustment, tighten both upper and lower hexagon nuts ② together so that the motor base will not go up and down.
- 8) Tighten bolts and nuts ③ and ④.
- 9) Fit bolt ① to the motor base on the bottom and fix them with nut. Bolt ① is pushing the motor base to prevent it from vibrating. Therefore, fix them so that the motor base will be pushed up.
- 10) Once the covers referred to in 1) and 2) have been mounted, the adjustment is completed.

(2) Checking the V-belt

The belt has a standard life expectancy of approximately 10,000 hours (approximately 3 years on the basis of 10 operating hours a day).

Even within the period mentioned above,

- 1) If the surface rubber layer has separated,
- 2) If one belt or two has been excessively loose and
- 3) If the belt has had its flank cracked, its service ability should be deemed to have reached the limit.

<Precautions to be taken in prolonging the belt life>

- 1) If some belts have broken, replace all with new belts. Jointly employing new and old belts will decrease the durability, being irregular in both length and elongation relative to stresses. When placing an order for the belt, please specify "X pieces of 3V-000 in a matched set." Belts having their lengths disperse will cause vibrations and noises. It is necessary, therefore, to align them to a uniform length as far as practicable.
- 2) Cleaning the pulley groove
With oils, dirt, dust or the like sticking to the groove, the belt will slip, resulting in a decreased life.
- 3) To place the belt on the pulley, do not fail to return the slide adjustment unit fully and put on the belt. Forcing the belt to be put on as if it were gouged would cause the belt to be damaged.

(3) Specification of V-belt

Item		QT 15N	QT 18N
		20HP 4500 rpm	20HP 3600 rpm
Type of belt		3 V-670	3 V-670
Number of belt		6 pvs.	6 pvs.
Adjusting the belt	Flexure	10.2 mm (0.40 inch)	10.2 mm (0.40 inch)
	Flexure load (new belt)	2.6 kg/pcs (5.73 lbs/pcs)	2.6 kg/pcs (5.73 lbs/pcs)
	Flexure load (retensioned belt)	2.3 kg/pcs (5.07 lbs/pcs)	2.3 kg/pcs (5.07 lbs/pcs)
	Flexure load (slip limit)	1.8 kg/pcs (3.97 lbs/pcs)	1.8 kg/pcs (3.97 lbs/pcs)

Note: The belt employed is a matched set of "Maxter Wedge Belts" made by Mitsubishi

(4) Adjustment of timing belt

For headstock positioning coder

- Type of timing belt: 334L-050 (L08MH003830)

- Adjusting value of tension force: 3.4 mm/0.4 ~ 0.56 kgf

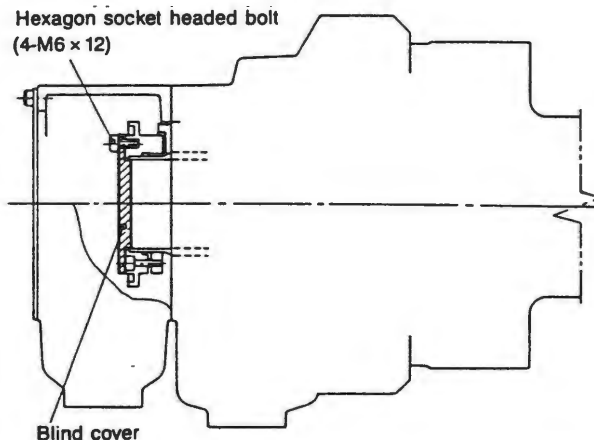
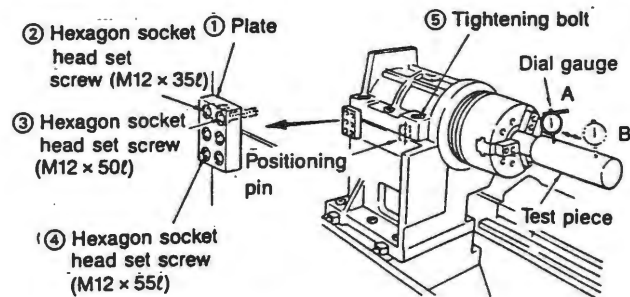
Note: Adjusting method of tension force is the same as that of V-belt.

5-4-2 Headstock

(1) Centering and adjusting the spindle

The spindle has been correctly aligned upon shipment. No adjustment, therefore, is required on the customer's part. If the spindle should get out of alignment due to a collision of the turret or for any other reason, take an adjustment in accordance with the steps given below.

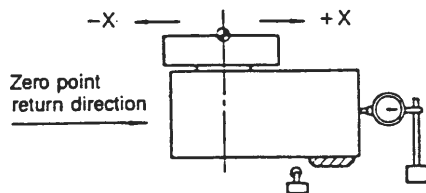
<Adjustment Steps>



- 1) Mount a 300 mm (118.11 inch) long $\phi 100$ mm ($\phi 39.37$ inch) test piece (round bar) onto the chuck.
- 2) Cut test piece into a cylinder.
- 3) Using a micrometer, measure the cylindricity. (Measure A and B of the figure).
- 4) Apply a dial gage to the test piece at the tip (B side) and set the gage to a reading of 0.
- 5) Loosen six ⑤ bolts clamping the headstock onto the head base.
- 6) For centering the spindle, adjust the hexagon socket head cap screw ② for pulling and the hexagon socket set screw ③ for pushing that are attached on the plate ① at the side of the spindle while observing the dial gauge reading. Be sure to tighten ③ after making a push of ④.
- 7) After completion of the adjustment, tighten bolt ⑤. At that time, headstock may get out of place by the bolt tightening force. Tighten bolt carefully with looking at the dial gage.
- 8) After completion of the operation, carry out cylindrical cutting and make certain that the cylindricity is within a

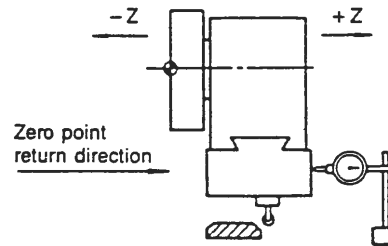
X-axis zero point establishing procedure

- 1) Adjust the push allowance of limit switch roller to 1.8 mm to set the distance between ON and OFF (L1) to *30 ~ 32 mm
 - Watching the display screen and using the manual pulse handle, set the distance between ON and OFF positions.
 - When mounting position of limit switch is not changed, this adjustment is unnecessary.
- 2) Position the turret at the machine zero point specified by the program chart.
 - This procedure is explained in (3) of chapter 5-4-4-1.
- 3) Put dial gauge against axial direction with it pushed into turret base 4 ~ 5 mm, and adjust the pointer to 0.
- 4) Input 0 to the zero point shifting volume parameter (S13-X).
- 5) Perform the zero point resetting operation. The position display goes to 0.
 - Manually shift the turret towards (-) X side by *6 mm.
- 6) Move the dog till the limit switch goes ON.
 - This allows LS OFF — machine zero point to be set to 3.0 mm.
- 7) Press the EMERGENCY STOP and perform the zero point resetting operation.
 - The turret is stopped at the electric origin and position value become 0.
- 8) Manually shift the turret toward (-) X side by *2.5 ~ 3.0 mm.
- 9) Move the dog on to the position where limit switch is turned ON.
 - This allows LS OFF → electric origin (L2) to be set to 1.25 ~ 1.5 mm.
- 10) Press the EMERGENCY STOP and perform the zero point resetting operation.
- 11) Move the turret to + side manually until dial gauge pointer comes to 0. Position value on the display is then read.
- 12) The position display value when the dial gauge reads 0 is input in parameter S13-X as shift amount.
- 13) Pressing EMERGENCY STOP, try to return X-axis to the zero point. Reading of 0 by dial gauge proves to be all right. If not all right, change the shift amount or repeat 1) ~ 12) mentioned above.



Z-axis zero point establishing procedure

- The procedure is the same as the X-axis mentioned above.
 - In the case of Z-axis, however, difference in procedure 1) 3) 5) and 8) below should be taken into account. Parameter for Z-axis 4), 12) is S13-Z.
- 1) The distance between the ON and OFF positions is specified to be *21.5 ~ 22.5 mm.
 - 3) Put the dial gauge against axial direction with it pushed into carriage 4 ~ 5 mm, and adjust the pointer to 0.
 - 5) Manually shift the turret towards (-) Z side by * 3 mm.
 - 8) Manually shift the turret towards (-) Z side by * 1.2 ~ 1.4 mm.



5-4-4-1 Absolute value coordinate setting when equipped with absolute value detecting function

Machine position has been lost by power cut-off operation, and thus it has been restored by zero return operation. However, the absolute value detecting system does not lose machine position by power cut-off operation.

Note: Except where losing absolute position described in (2).

(1) How to set absolute value coordinate when equipped with absolute value detecting function.

Perform zero return operation in 4-4-1. See the figure of 50 page.

- 1) Fix a plate ③ to the slideway to press it against tail stock head faces forward. (Tailstock to forward)
- 2) Tighten securely a hexagon socket headed bolt ④. (Tailstock base is turned to rear side.)
- 3) Tighten tentatively a hexagon socket headed bolt ②. (Tailstock base/bed)
- 4) Measure the parallelism of carriage to slideway. If satisfactory parallelism is not attained, swing the slideway with hexagon socket bolt ④ right and left. (Tolerance 10 μm)
- 5) After checking accuracy, tighten firmly a hexagon socket headed bolt ② if no failure is found.
- 6) Position the cross direction of slideway with special bolt ⑤.

(2) Usually zero return operation is not required when equipped with absolute value detecting function. However, when the following occurs, operation must be performed in a specified way.

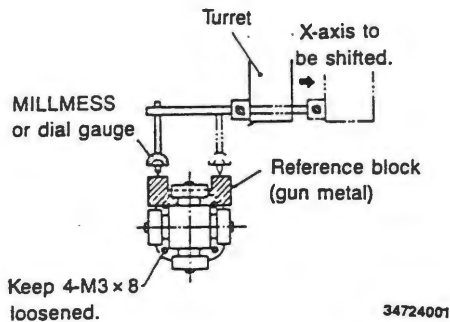
- 1) When the battery storing absolute value drops in power or its service life is over.
- 2) When the detector is replaced or removed.
- 3) When the servo amplifier is replaced.
- 4) When a memory for data storage in NC is replaced or its service life is over.
- 5) When mechanical system gets out of order due to machine collision, etc.
- 6) When error is displayed by error check in storage data, be sure to set absolute value coordinate according to 5-4-4-1 how to set absolute value coordinate when equipped with absolute value detecting function.

(3) Machine zero point positioning

Position the turret at machine zero point given in program diagram in the following step.

X axis positioning:

- 1) Load a testpiece (round bar) into the chuck, and perform peripheral cutting. Measure the diameter exactly, and set it to D.



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5-4-7 Turret

When reloading a spare turret for the turret, or when correcting misalignment of turret due to turret collision, follow the procedure described below.

Octagonal, dodecagonal, octagonal 16 indexing turret
<Procedure for removal of turret>

- 1) Turn manual mode to index T01 tool position.
- 2) Display **POSITION** or **COMMAND** display, and press **UNCLAMP** on menu to make reverse display. This operation allows the turret to be kept unclamped.

Note: Don't remove the turret with it clamped because it may cause damage to the components.

- 3) Take off a cap in the center of turret.
- 4) Remove fluted nut locking bolt.
- 5) Loosen fluted nut with special tool socket, and remove it.
- 6) Remove the turret from spline shaft.

<Procedure for turret installation>

- 1) Insert the turret into the spline shaft so that turret face T01 faces the center side.
- 2) After making sure that index coupling teeth are in engagement, fit fluted nut, locking bolt and cap in their order. This completes installation.
- 3) Press **UNCLAMP** on menu to put out reverse display.

Notes

- 1: After work is over, be sure to turn off **UNCLAMP**. (Reverse display is put out.) While **UNCLAMP** is ON, the turret cannot be turned due to interlock.
- 2: Index coupling, which indexes turret, is extremely vulnerable to dust. Clean around the turret before and after reloading and use care to prevent foreign substances from adhering.
- 3: Turret unclamping stroke is set to 5 mm(4 mm) — 0.2 inch(0.16 inch), and the clearance between index coupling teeth is set to 1 mm in turning. () shows a value for octagonal 16 indexing turret.
- 4: Refer to turret assembly drawing in the machine drawing set.

5-4-8 Tailstock

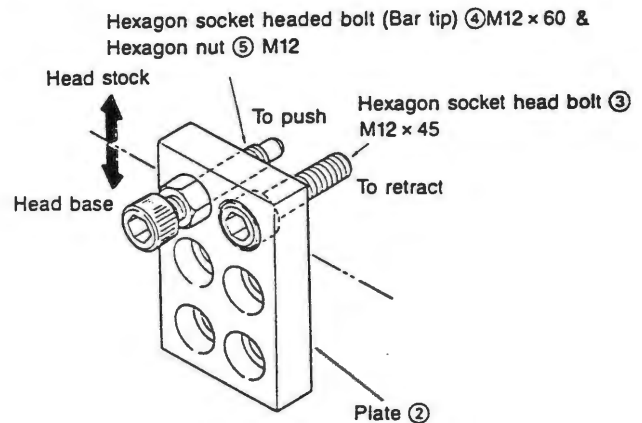
- (1) Aligning the tail spindle

Vertical Direction:

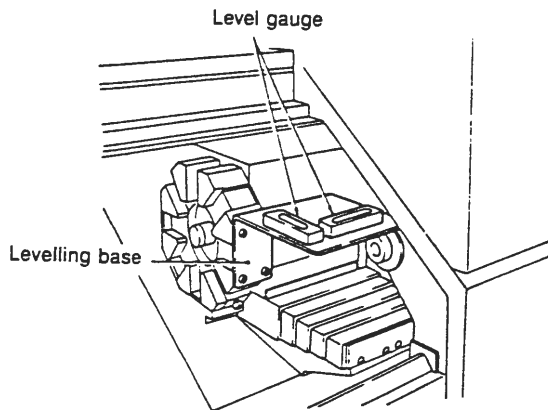
Vertical alignment of tailstock is made by the adjustment of shim thickness. The shim is grinded in the best state to align the tailstock in vertical direction before shipment.

Horizontal Direction:

- 1) Fix a plate ③ to the slideway to press it against tail stop head faces forward.. (Tailstock to forward)
- 2) Tighten securely a hexagon socket headed bolt ④.
- 3) Tighten tentatively a hexagon socket headed bolt ②.
- 4) Measure the parallelism of carriage to slideway. If satisfactory parallelism is not attained, swing the slideway with hexagon socket bolt ④ right and left. (Tolerance 10 μ m)
- 5) After checking accuracy, tighten firmly a hexagon socket headed bolt ② if no failure is found.
- 6) Position the cross direction of slideway with special bolt ⑤.



5-4-9 Other maintenance related to the machine



(1) Inspection of bed level

Check bed level every month for six month after machine installation. If the level is out of order then, correct it for normal maintenance at all times. After six months are over, extend the interval of check as required. If there is little change in conditions, check the bed level periodically once or twice a year. Refer to a statement of accuracy supplied to every machine as to how to level and the tolerance.

(2) Inspection of wiper

Wiper attached to each sliding part prevents chip entry into the slideway and serves to keep oil level constant. To this end, always pay attention to unusual wear of wiper lip part, flaws caused by chips and the like. If there is something wrong with wiper, replace it without delay.

(3) Seal coating

The machine is shipped with the cutting space totally enclosed to prevent water leakage. If any water leakage should be found, coat sealant supplied with standard tools.

5-4-10 Electrical maintenance

(1) Inspection of spindle motor

Inspect spindle motor and controller regularly according to "Spindle motor maintenance manual".

(2) Inspection of X-axis and Z-axis servo motors

Refer to "Servo motor maintenance manual" for inspection and maintenance.

(3) Inspection of connection between machine units

Check for looseness of electrical connection between units of NC unit, machine body, hydraulic unit, control box, etc.

1) Looseness of canon connector

Check for looseness of connector at each connections, and retighten if necessary.

2) Looseness of terminal screw

Check for looseness of electric part terminal screw at relay part and each operation panel, and tighten up if necessary.

3) Looseness of limit switch

Check for looseness of terminal screw and fitting screw at limit switch, and tighten up if necessary.

(4) Inspection of control box

Turn off power to inspect control box.

1) Terminal screw and soldering part

Check for looseness of electric part terminal screw, and retighten if necessary. Check soldering strength by softly pulling the soldering part at relay panel.

2) Plug fuse

Check for looseness of cap, and tighten up if necessary

3) Spark killer

Check individual spark killers. Replace spark killer having discolored case.

4) Cleaning

Clean dust and chips which may cause troubles with care.

5) Air filter

Clean dirty and dirkish air filter softly in water.

5-5 Trouble Shooting

5-5-1 Checking point upon encountering trouble

If the following troubles has occurred, carry out each checking points. Upon encountering the troubles, the alarm message and **DIAGNOSIS** display on the screen will come to an aid for trouble shooting.

As concerns the contents of alarm, refer to "Instruction Manual for NC Device".

(1) Coolant does not come out.

- 1) On operation panel, COOLANT menu key is set properly. M code program is not wrong.
- 2) Suction port of coolant pump is sunk down completely in the coolant
- 3) Chip pan filter and pump suction filter is not clogged
- 4) Coolant pump motor is running.
- 5) In control panel, coolant pump motor thermal relay has not tripped.

(2) Headstock has abnormally high temperatures.

- 1) Headstock is not lubricated properly in the interior.
- 2) Spindle bearing is improperly preset to preliminary pressure.

(3) X- and Z-axis have zero point disperse.

- 1) Zero point check limit switches are loosely mounted.
- 2) Dispersion is limited to 12 mm(0.47 inch) (Z-axis) (as read in the counter) or 10 mm(0.39 inch). (X-axis)
- 3) Resolver for axis with its zero point dispersing may have been loosely mounted.

(4) Positioning show poor accuracy of repetition.

- 1) Gibbs are not properly adjusted.
- 2) Linear guide is improperly lubricated.
- 3) Coupling bolts and taper pins are loose.
- 4) Resolver is loosely mounted.
- 5) Coupling of resolver is loosely mounted.

(5) Machine does not operate after collided.

- 1) READY lamp illuminates.
- 2) NC unit is indicating alarm number.
- 3) Any portion may be gouged.

(6) Chuck jaws do not operate.

- 1) Chucking pressure adjustment reducing valve is not set to appropriate value.
- 2) Chuck jaw opening/closing solenoid valves are operating properly.
- 3) Foot switch is functioning properly.
- 4) Auxliary relay actuated with foot switch turned on and off is operating properly.
- 5) Neither wedge plunger nor master jaw is seized.

(7) Hydraulic chuck jaws have smaller strokes.

- 1) Whether a large quantity of chips are inserted into the inner part.
- 2) Whether the rotative hydraulic cylinder and connecting rod are loosened.

6. TOOLING

6 -1 Tooling system

6-1-1 List of tool holders

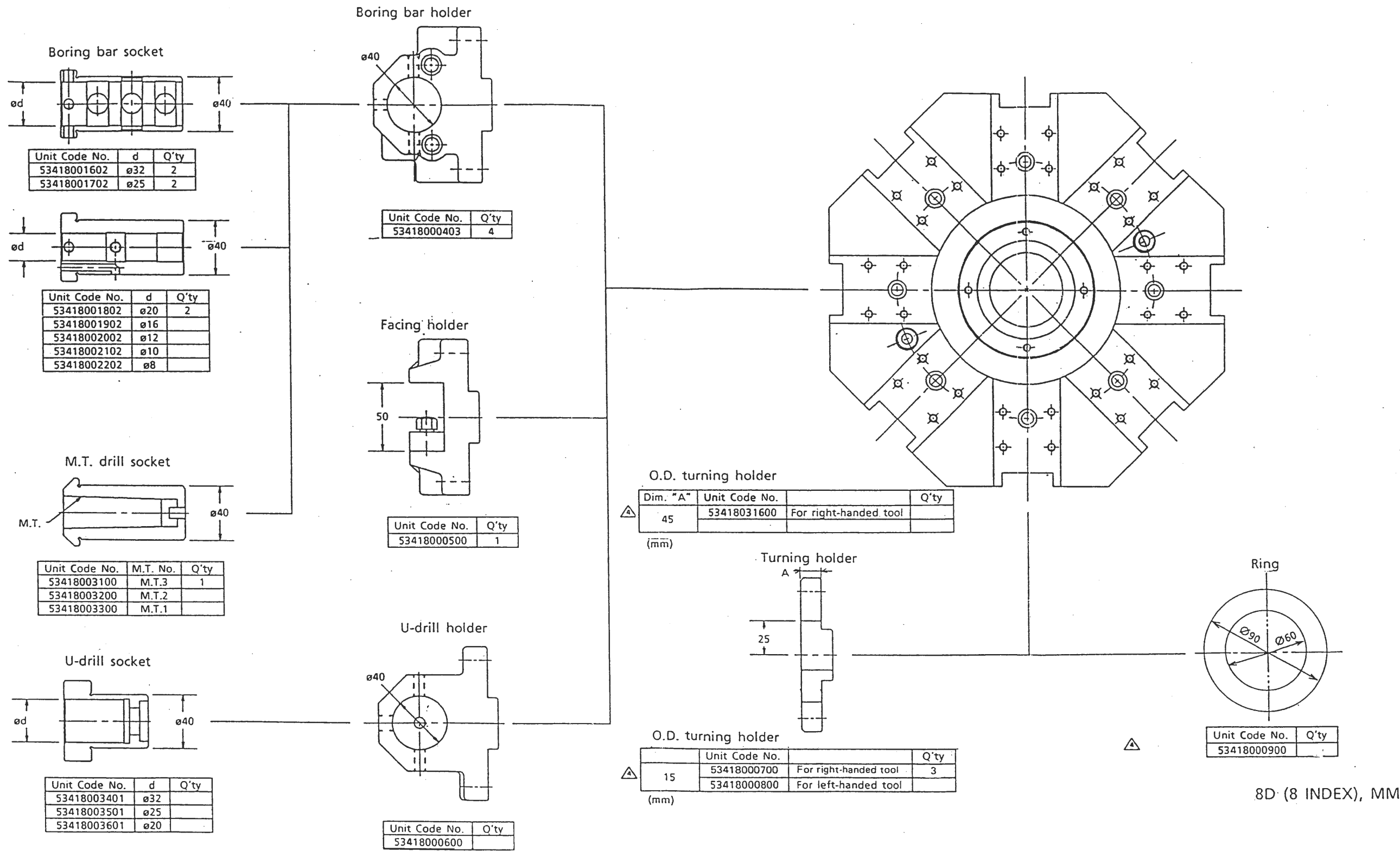
a) Metric system

(): Parts code No.

Tool holder		Unit Code No.	Octagonal drum turret		Dodecagonal drum turret
			8-position indexing	16-position indexing	
O.D. turning holder (for left-handed tool)				53418004900 (23418042580)	
		53418000800 (REV) (23418041130)		53418005000 (23418042590)	
Boring bar holder		53418000403 (23418045432)		53418004600 (23418042551)	
				53418004700 (23418042561)	
Facing holder		53418000500 (23418041090)		53418004800 (23418042601)	53418000201 (23418041031)
U-drill holder		53418000600 (23418041110)		53418005200 (23418042570)	
Block tool holder				53418005100 (5155U000080)	
O.D. turning holder (for right-handed tool)		53418031600 (23418052240)			
Ring (for zero cutting)		53418000900 (43418052360)			
Boring bar socket & sleeve	Sleeve	ø8 × ø40	53418002202 (43418045491)	53418006501 (23418042711)	53418002902 (33418041422)
		ø10 × ø40	53418002102 (43418045481)	53418006401 (23418042701)	53418002802 (33418041412)
		ø12 × ø40	53418002002 (43418045471)	53418006301 (23418042691)	53418002702 (33418041402)
		ø16 × ø40	53418001902 (43418045461)	53418006201 (23418042681)	53418002602 (33418041392)
		ø20 × ø40	53418001802 (43418045451)	53418006101 (23418042671)	53418002502 (33418041382)
	Socket	ø25 × ø40	53418001702 (43418041322)	53418001702 (43418041322)	53418002402 (33418041892)
		ø32 × ø40	53418001602 (43418041412)	53418001602 (43418041412)	53418002302 (33418041882)
		ø20 × ø40	53418003601 (43418041502)	53418003601 (43418041502)	53418003901 (33418041532)
	U drill socket	ø25 × ø40	53418003501 (43418041492)	53418003501 (43418041492)	53418003801 (33418041522)
		ø32 × ø40	53418003401 (43418041482)	53418003401 (43418041482)	53418003701 (33418041512)
Drill socket	M.T.#1 × ø40		53418003300 (43418041471)	53418003300 (43418041471)	53418003300 (43418041471)
	M.T.#2 × ø40		53418003200 (43418041461)	53418003200 (43418041461)	53418003200 (43418041461)
	M.T.#3 × ø40		53418003100 (43418041451)	53418003100 (43418041451)	53418003100 (43418041451)

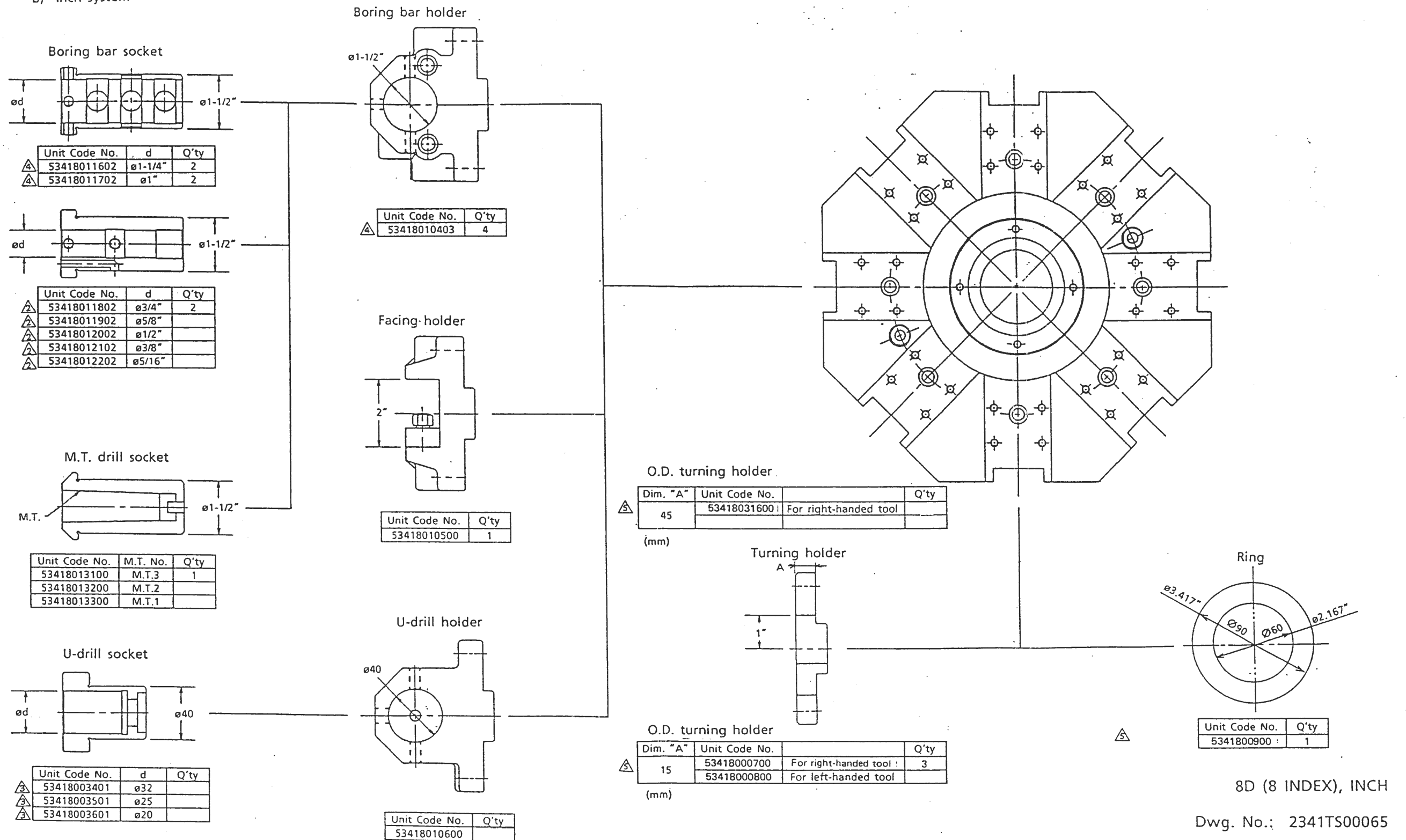
6-1-2 Tooling system diagram
(1) Octagonal drum turret with 8-position indexing function

a) Metric system



Dwg. No.: 2341TS00054

b) Inch system

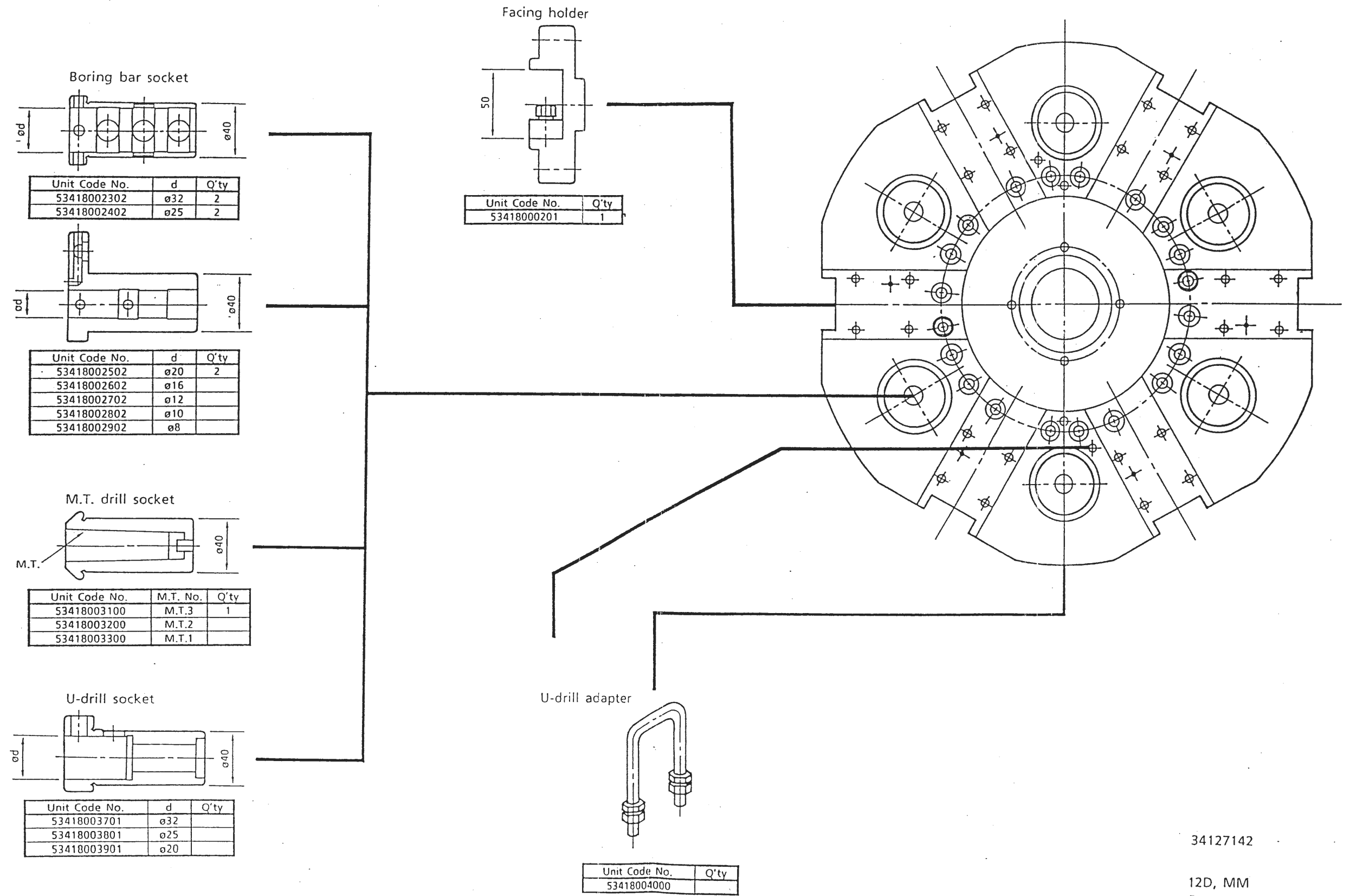


8D (8 INDEX), INCH

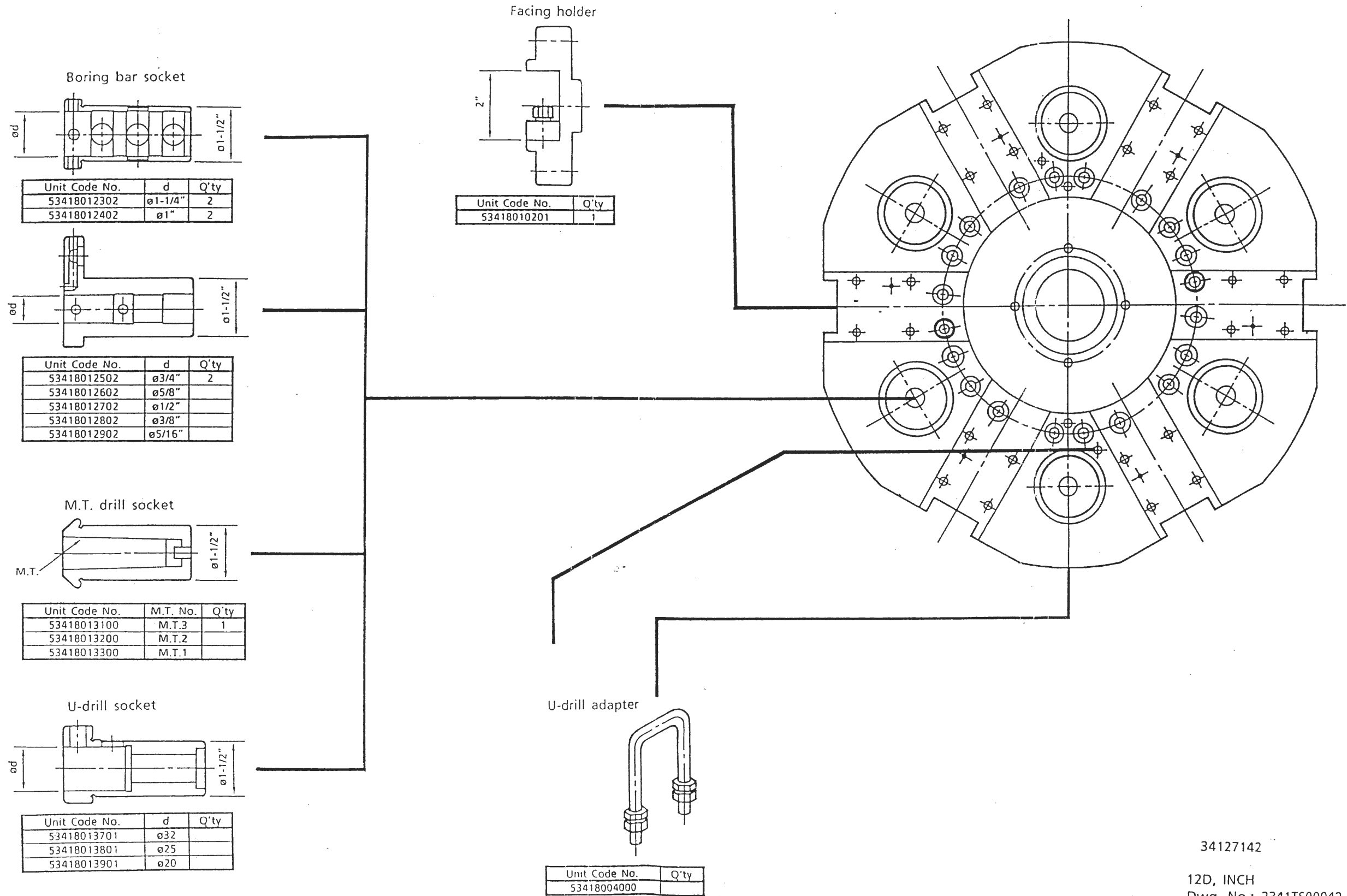
Dwg. No.: 2341TS00065

(2) Dodecagonal drum turret

a) Metric system



b) Inch system

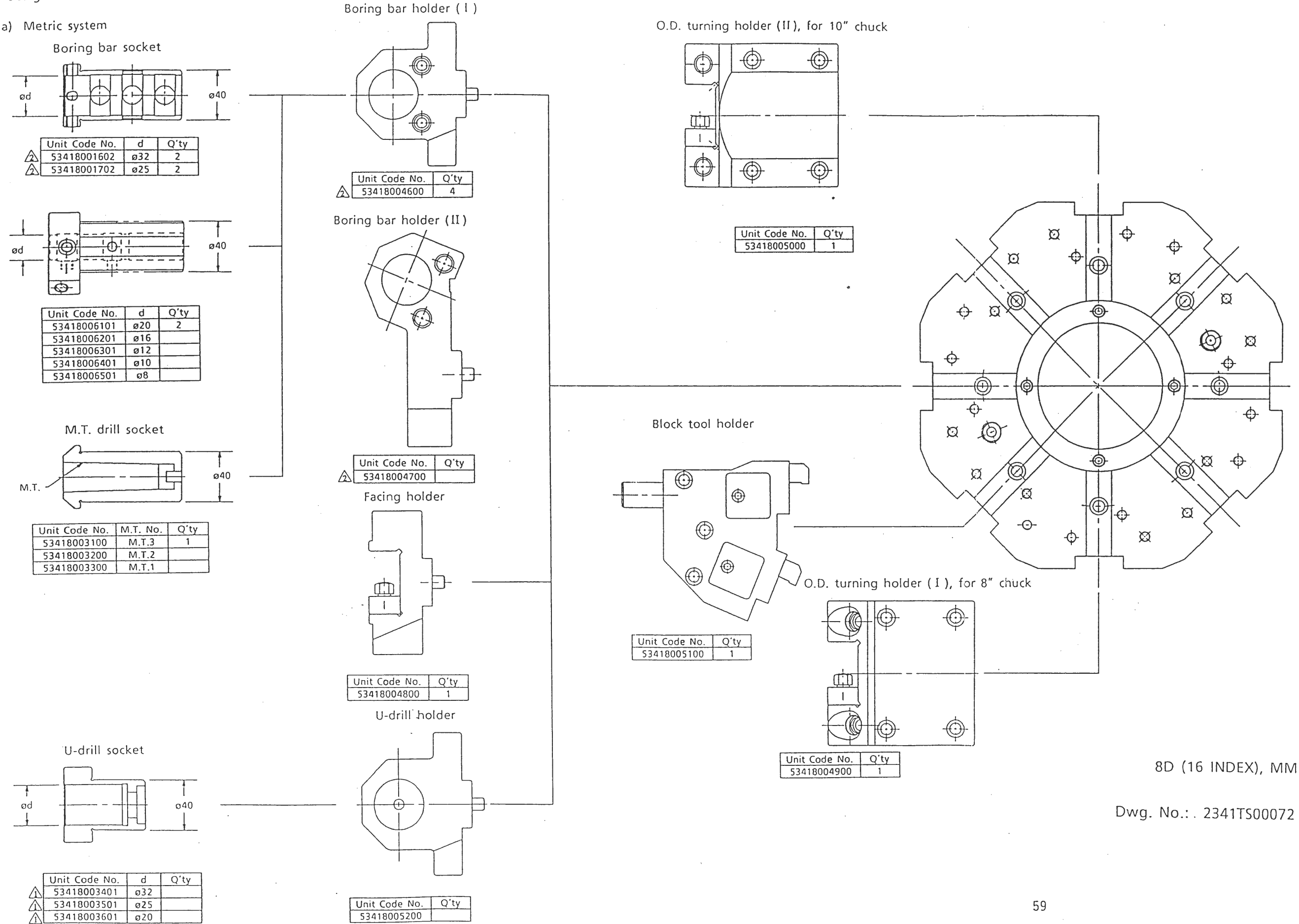


34127142

12D, INCH
Dwg. No.: 2341TS00042

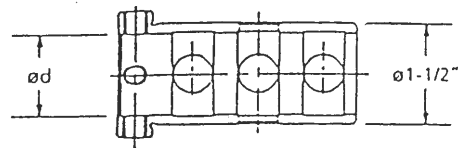
(3) Octagonal drum turret with 16-position indexing function

a) Metric system

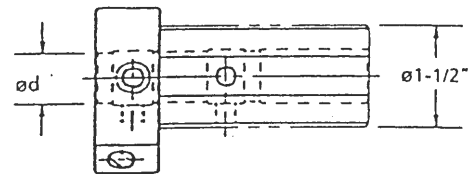


b) Inch system

Boring bar socket

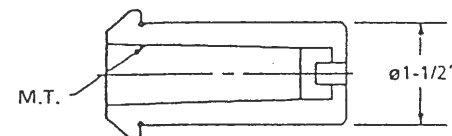


Unit Code No.	d	Q'ty
53418011602	$\phi 1-1/4''$	2
53418011702	$\phi 1''$	2



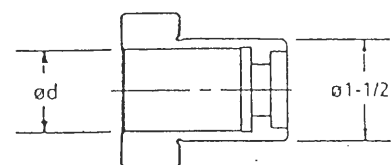
Unit Code No.	d	Q'ty
53418016101	$\phi 3/4''$	2
53418016201	$\phi 5/8''$	
53418016301	$\phi 1/2''$	
53418016401	$\phi 3/8''$	
53418016501	$\phi 5/16''$	

M.T. drill socket



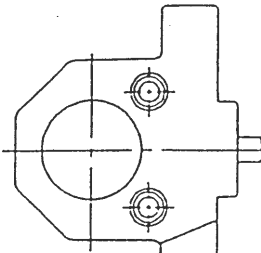
Unit Code No.	M.T. No.	Q'ty
53418013100	M.T.3	1
53418013200	M.T.2	
53418013300	M.T.1	

U-drill socket



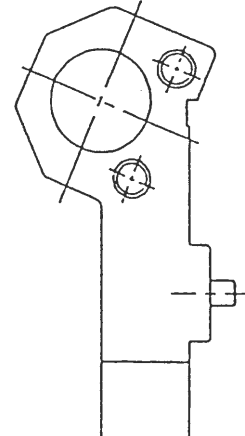
Unit Code No.	d	Q'ty
53418013401	$\phi 32$	
53418013501	$\phi 25$	
53418013601	$\phi 20$	

Boring bar holder (I)



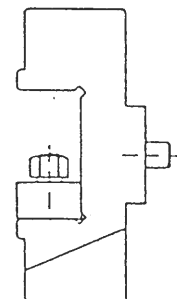
Unit Code No.	Q'ty
53418014600	4

Boring bar holder (II)



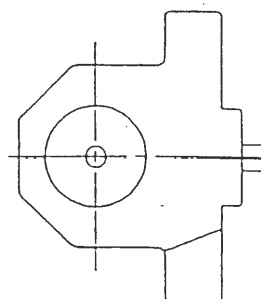
Unit Code No.	Q'ty
53418014700	

Facing holder



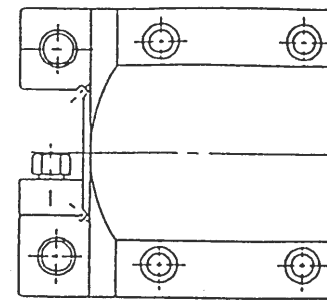
Unit Code No.	Q'ty
53418014800	1

U-drill holder



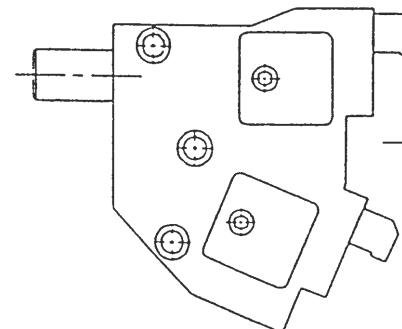
Unit Code No.	Q'ty
53418015200	

O.D. turning holder (II), for 10" chuck



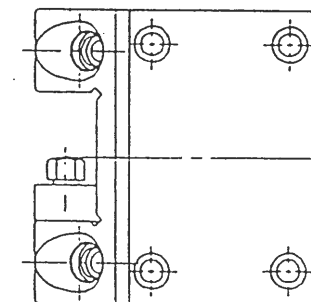
Unit Code No.	Q'ty
53418015000	1

Block tool holder

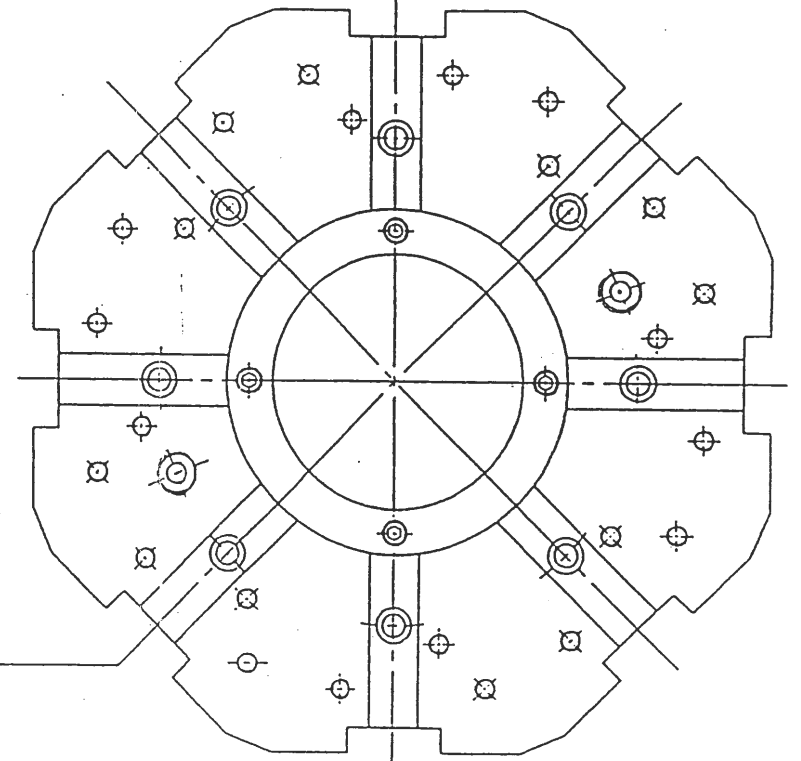


Unit Code No.	Q'ty
53418015100	1

O.D. turning holder (I), for 8" chuck



Unit Code No.	Q'ty
53418014900	1



8D (16 INDEX), INCH

Dwg. No.: 2341TS00082

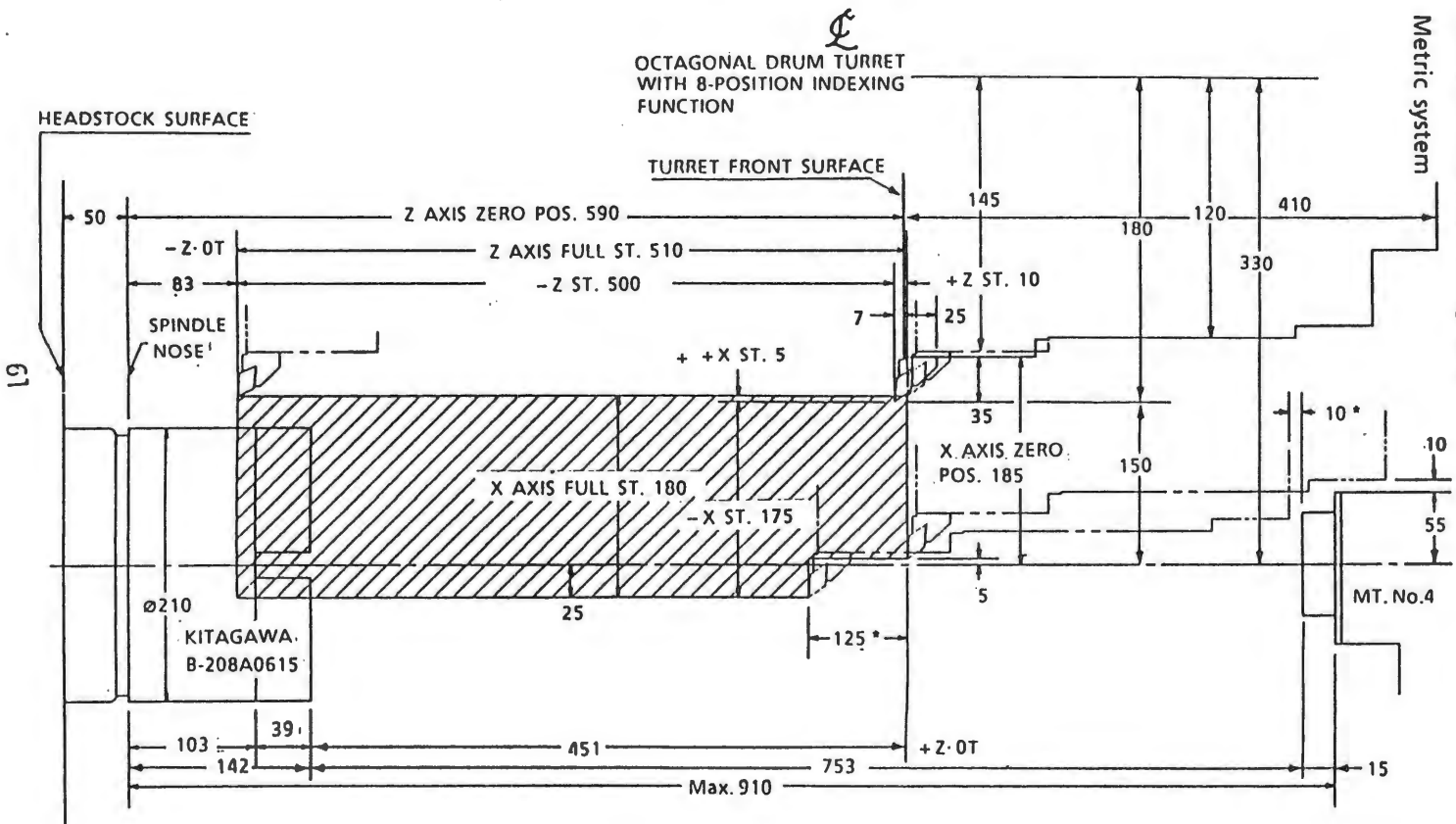
6-2 Programming chart

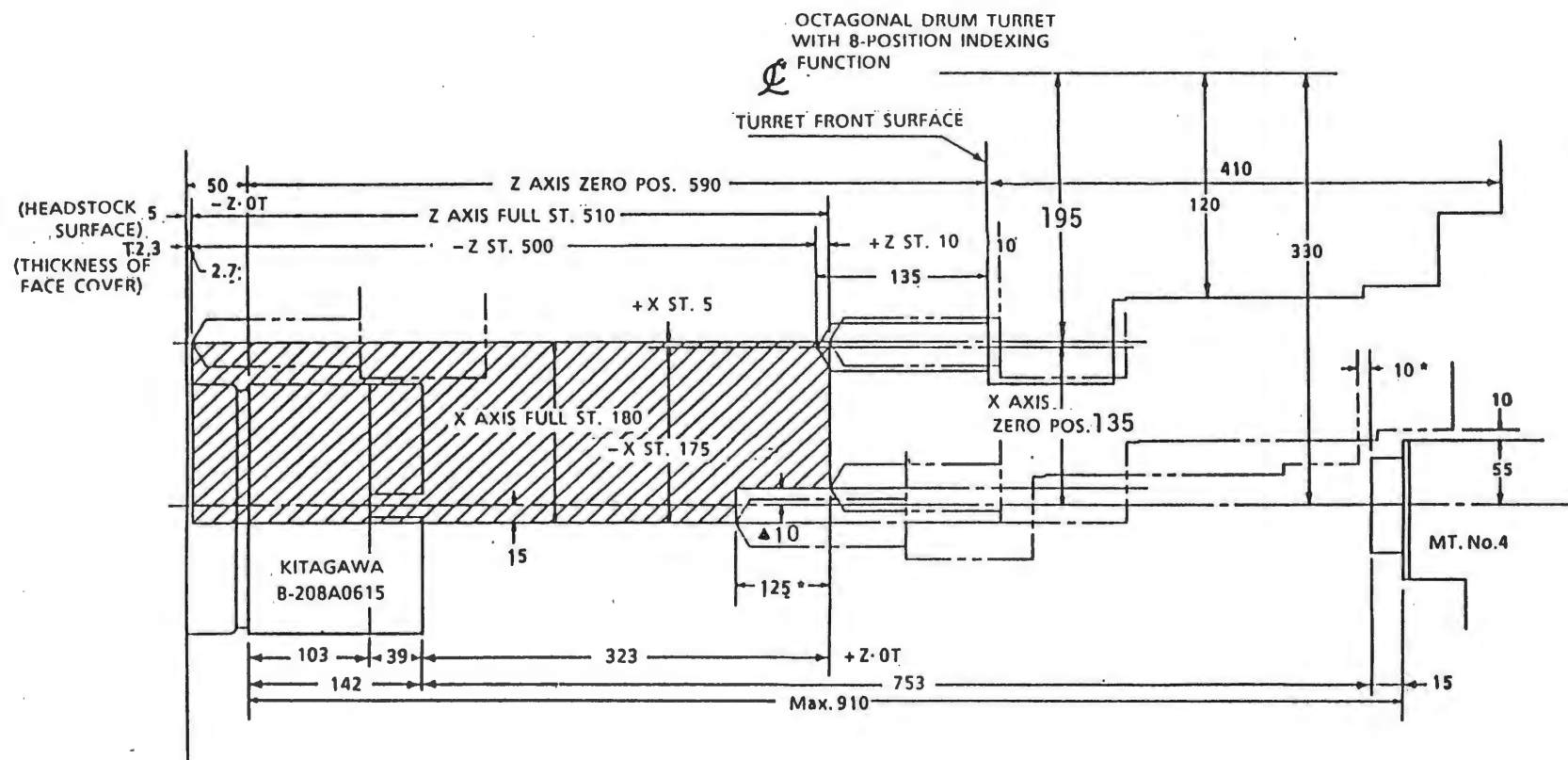
6-2-1 Programming chart of QUICK TURN 15N

(1) Octagonal drum turret with 8" chuck

1) For universal type

a) Chuck work (with turning tool)

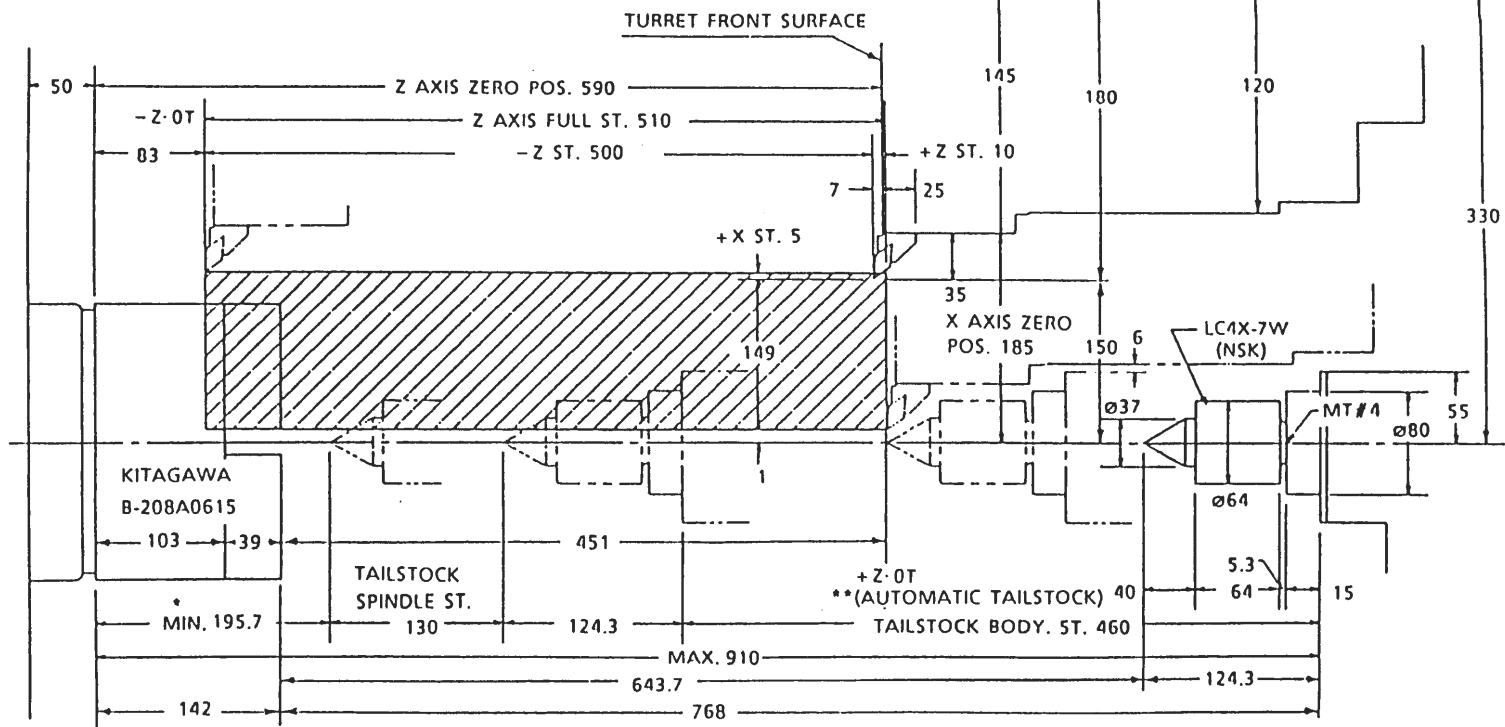




b) Chuck work
Metric system

Note) Δ marked dimension is minus.

OCTAGONAL DRUM TURRET
WITH 8-POSITION INDEXING
FUNCTION



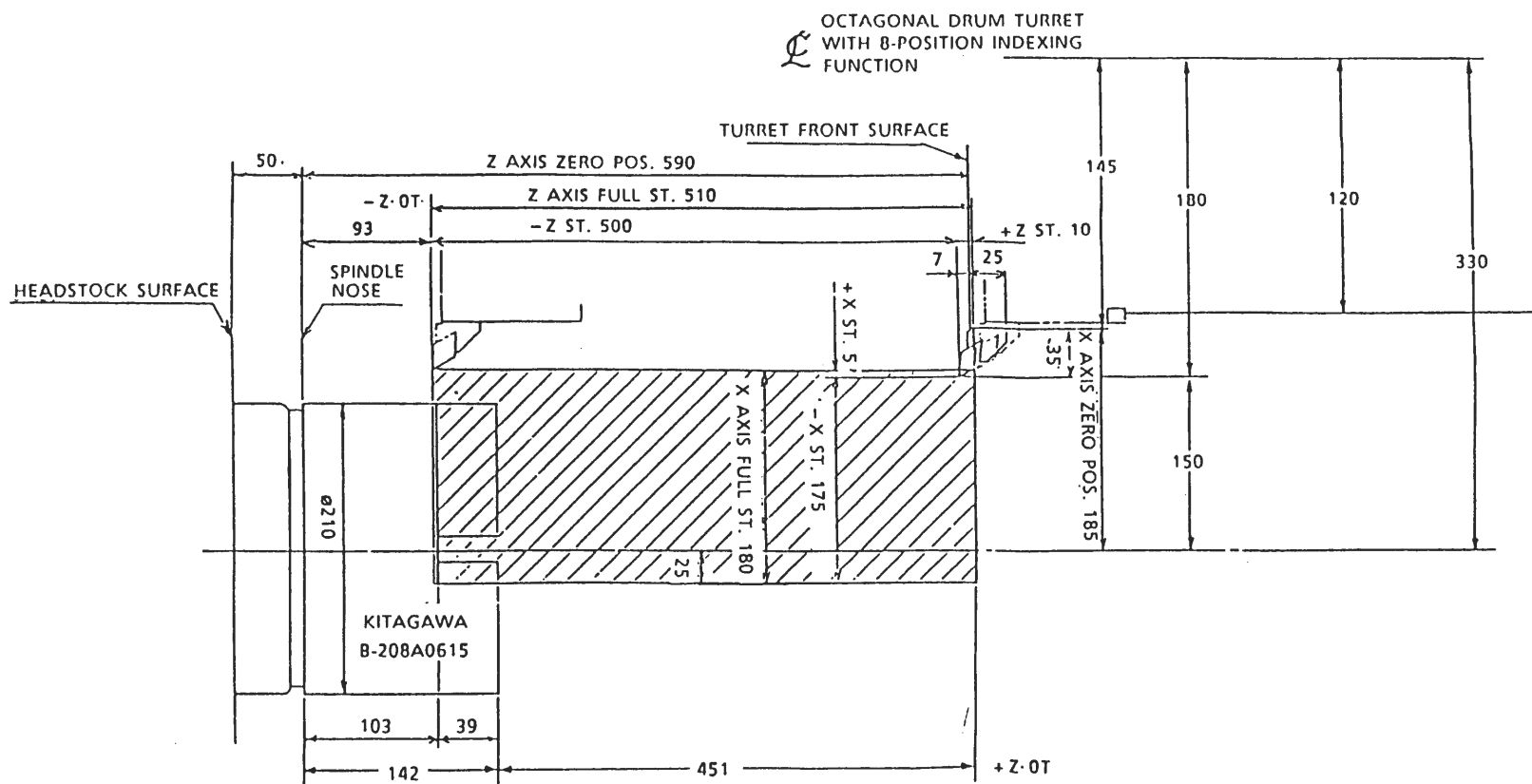
c) Shaft work
Metric system

Note) *- and **-marked dimensions shall be respectively 175.7 mm and 480 mm with a manual tailstock.

2) For chucker type

a) Chuck work (with turning tool)

Metric system

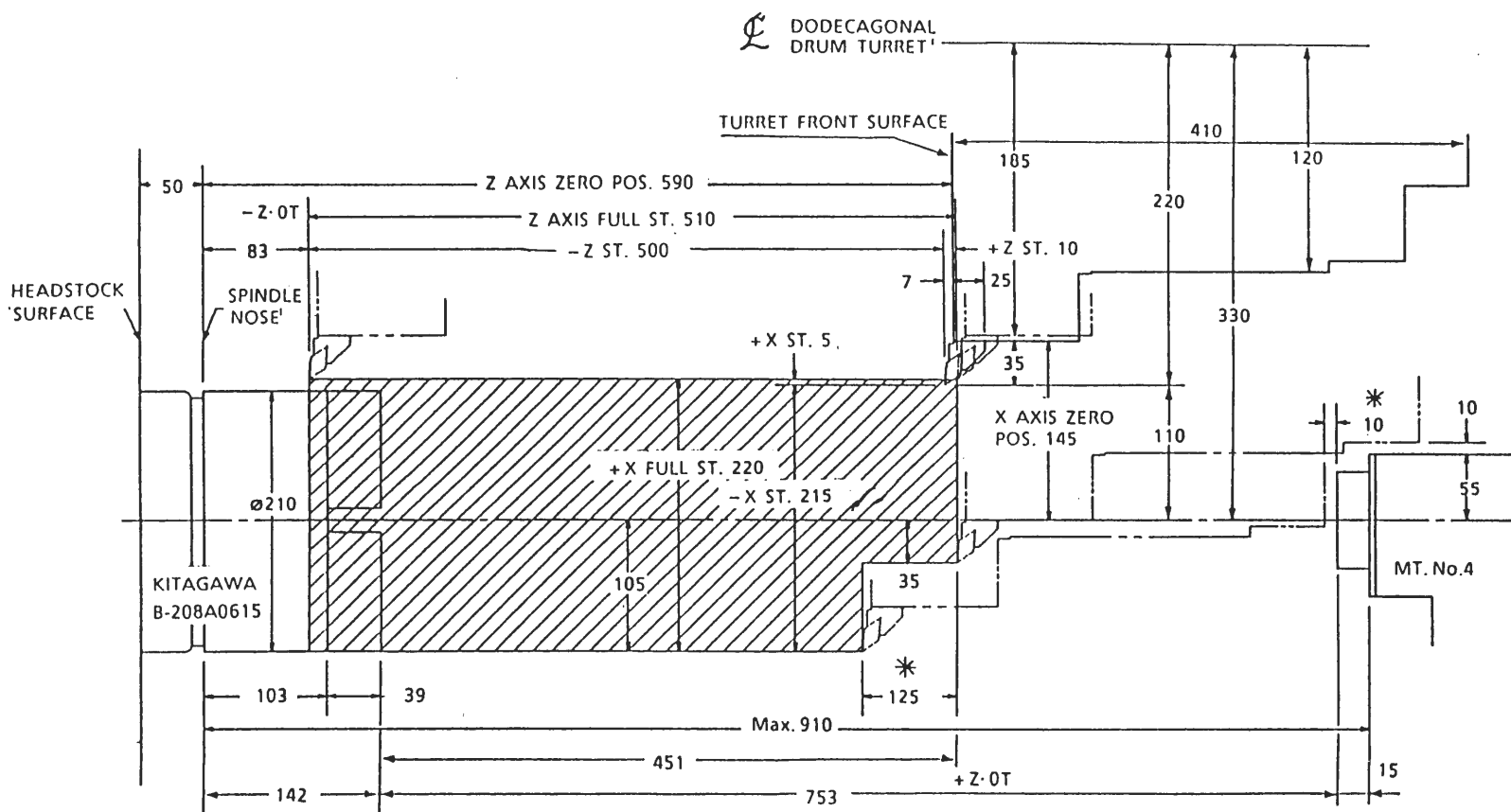


2341PR00130

1) For universal type

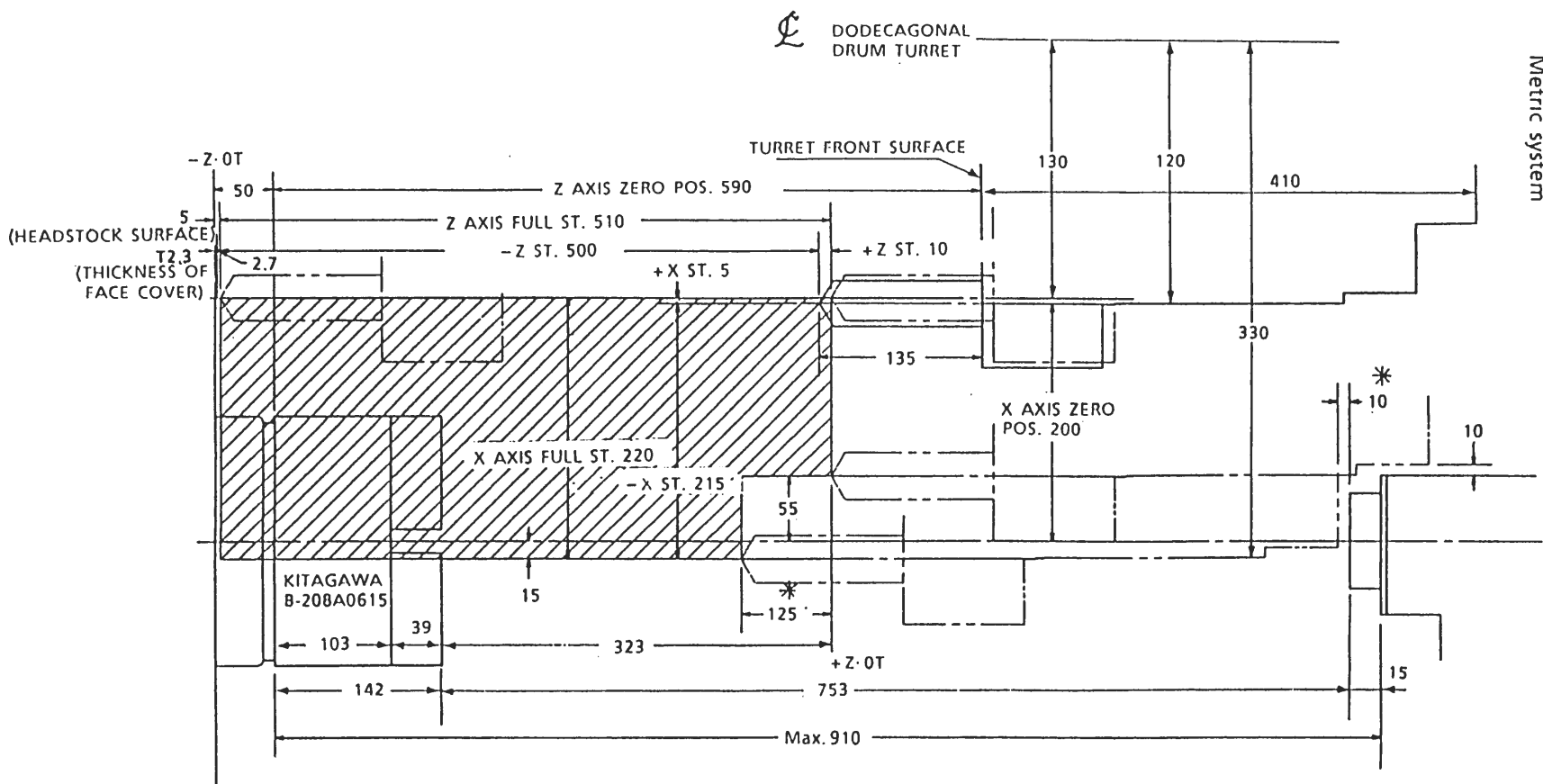
a) Chuck work (with turning tool)

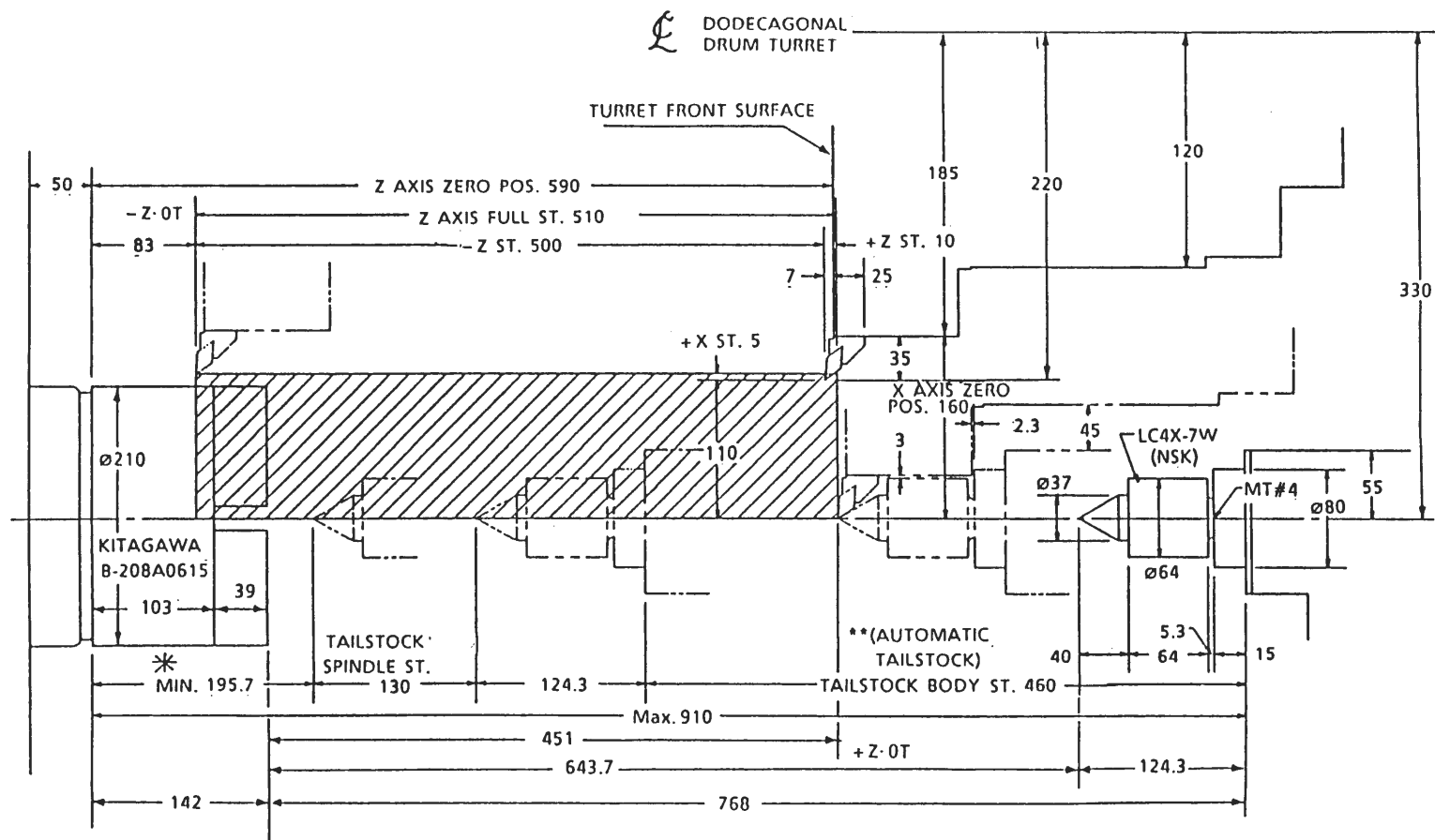
Metric system



b) Chuck work (with boring bar)

Metric system





c) Shaft work
Metric system

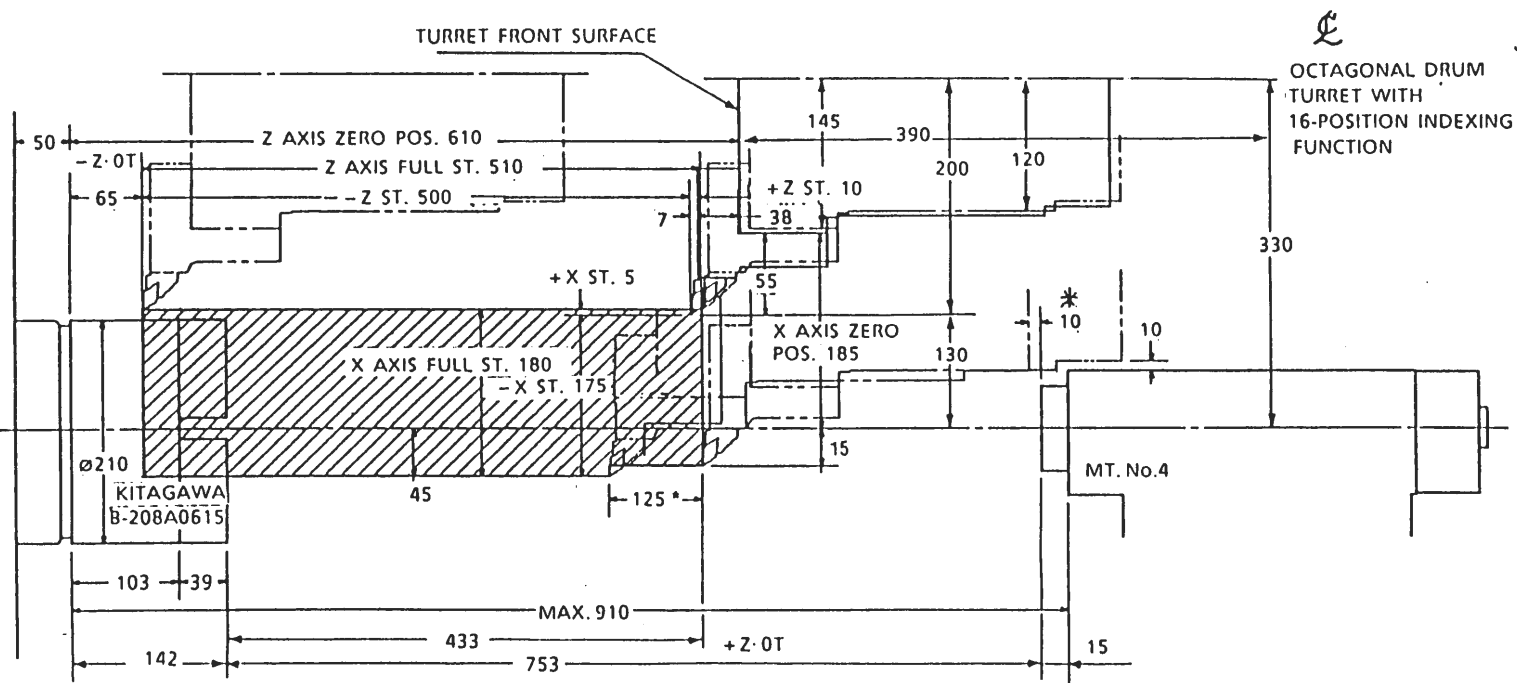
Note) *- and **-marked dimensions shall be respectively 175.7 mm and 470 mm with a manual tailstock.

(3) Octagonal drum turret with 16-position indexing function and 8" chuck

1) For universal type

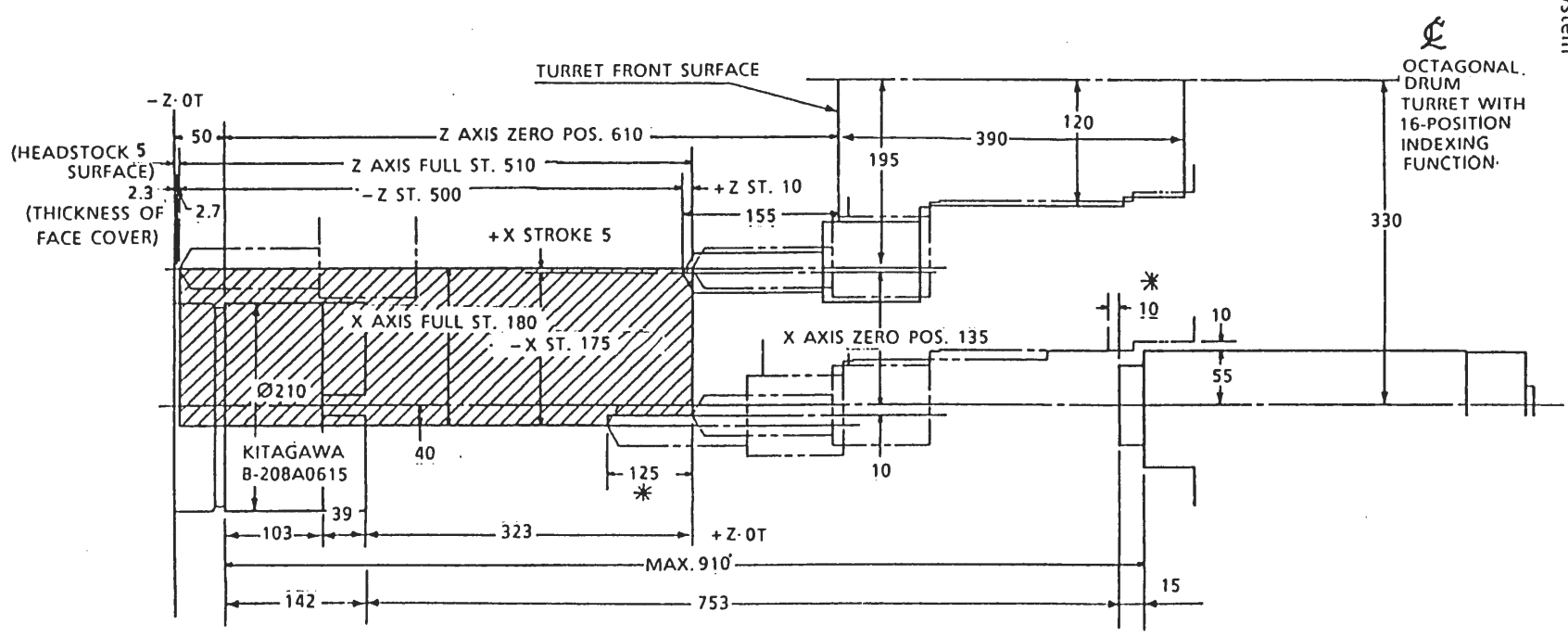
a) Chuck work (with turning tool)

Metric system

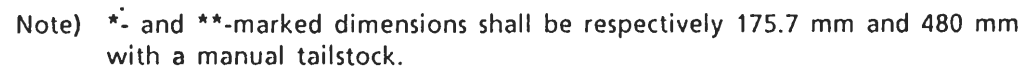


b) Chuck work (with boring bar)

Metric system



Metric system



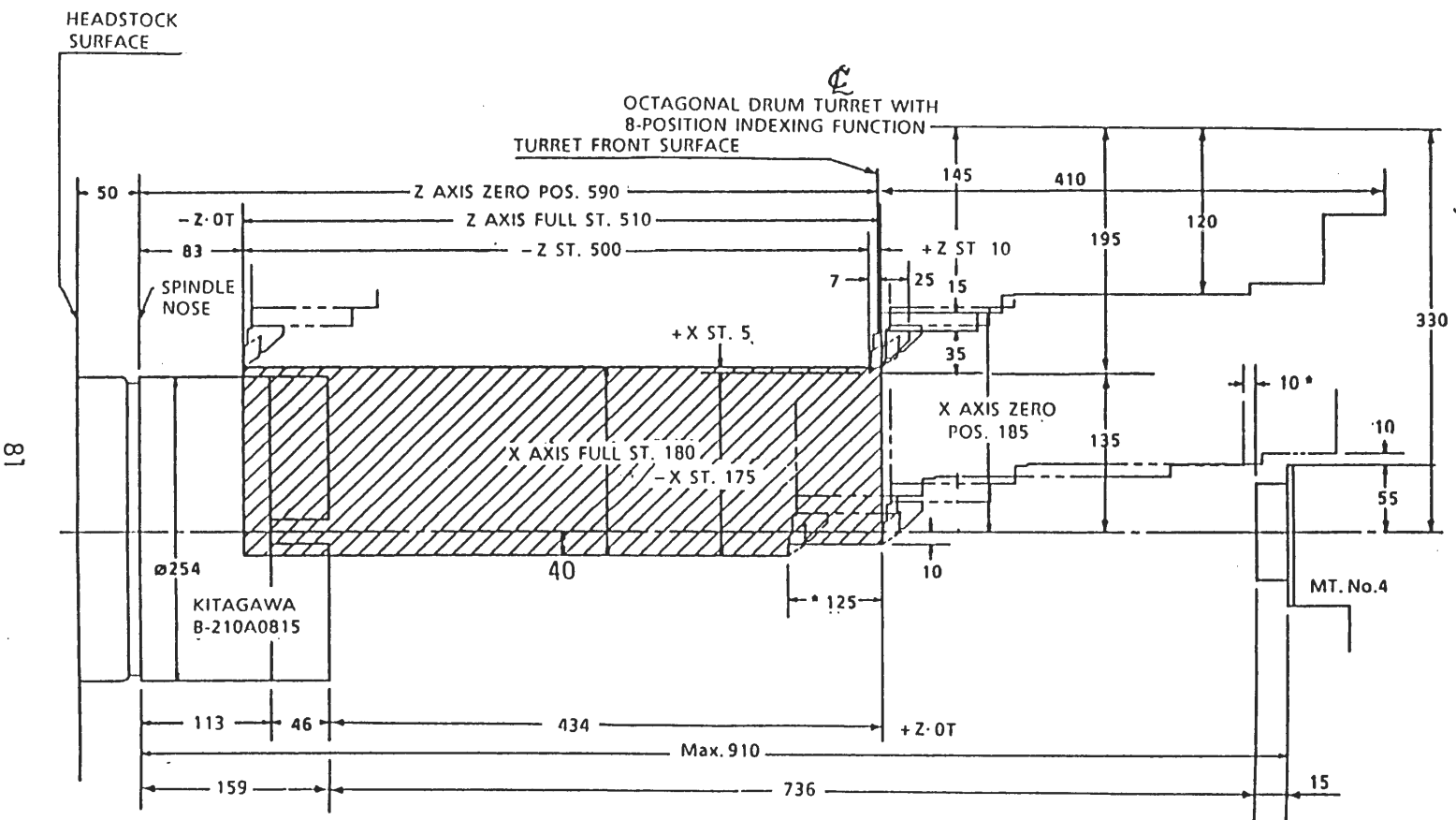
6-2-2 Programming chart of QUICK TURN 18N

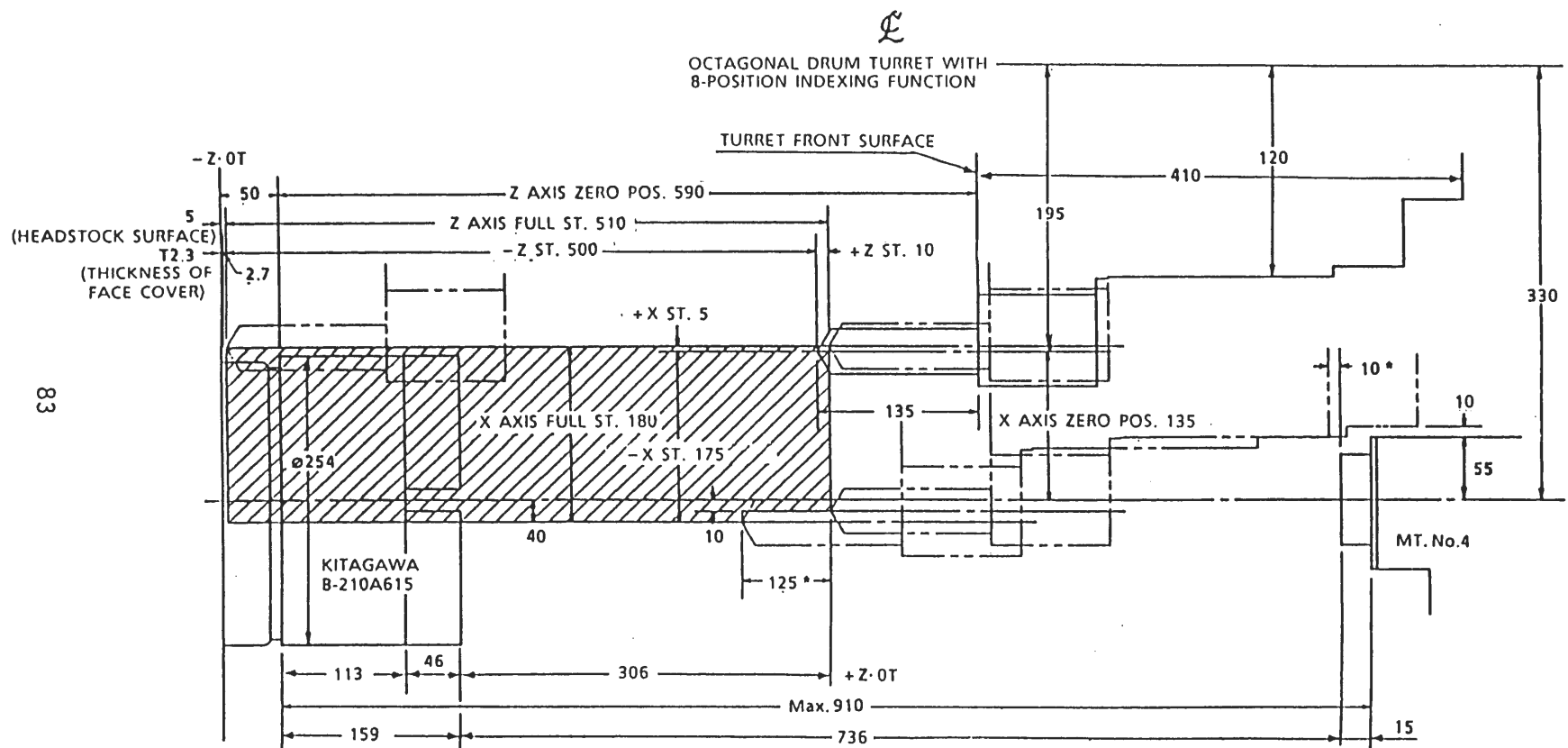
(1) Octagonal drum turret with 10" chuck

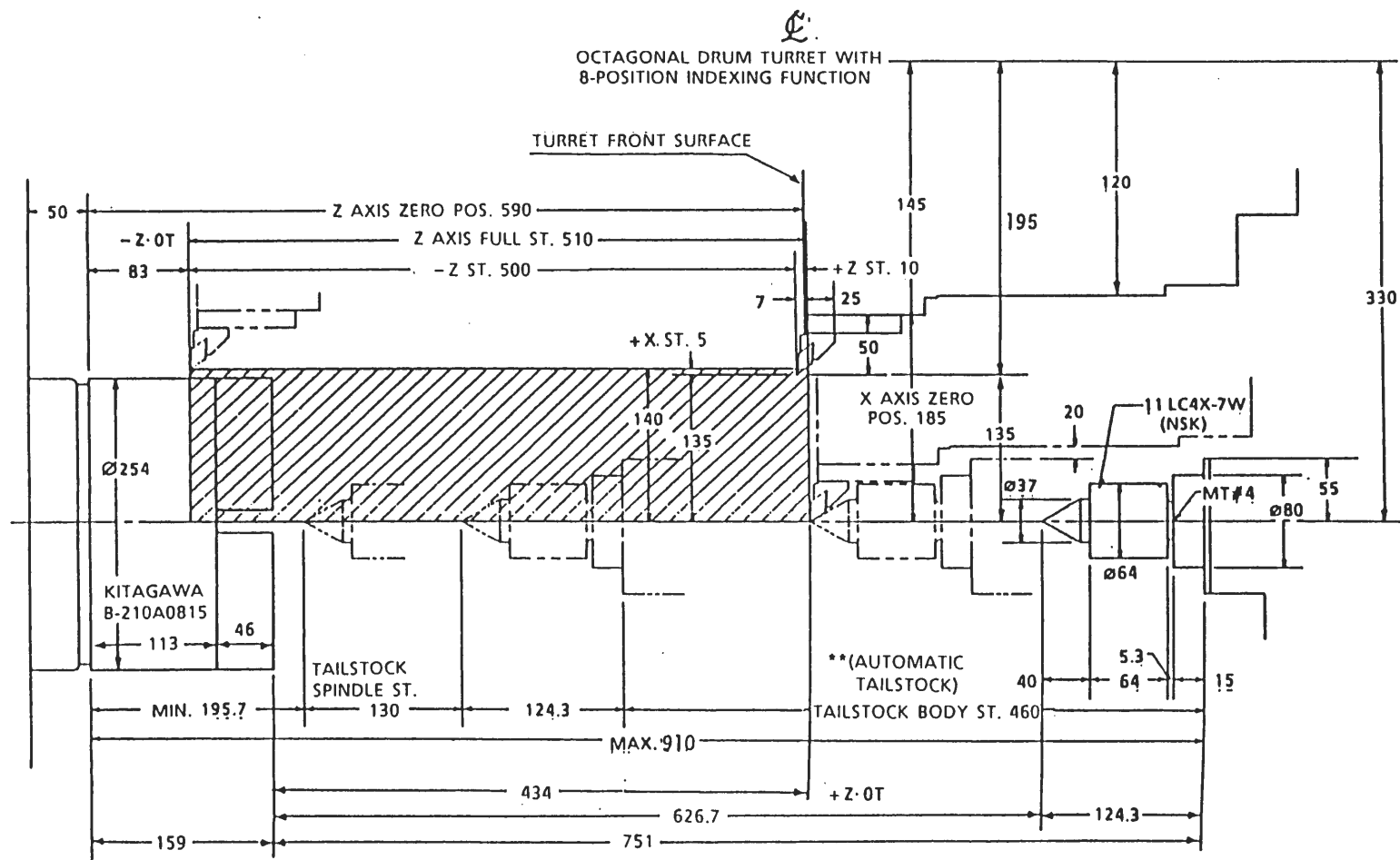
1) For universal type

a) Chuck work (with turning tool)

Metric system







c) Shaft work
Metric system

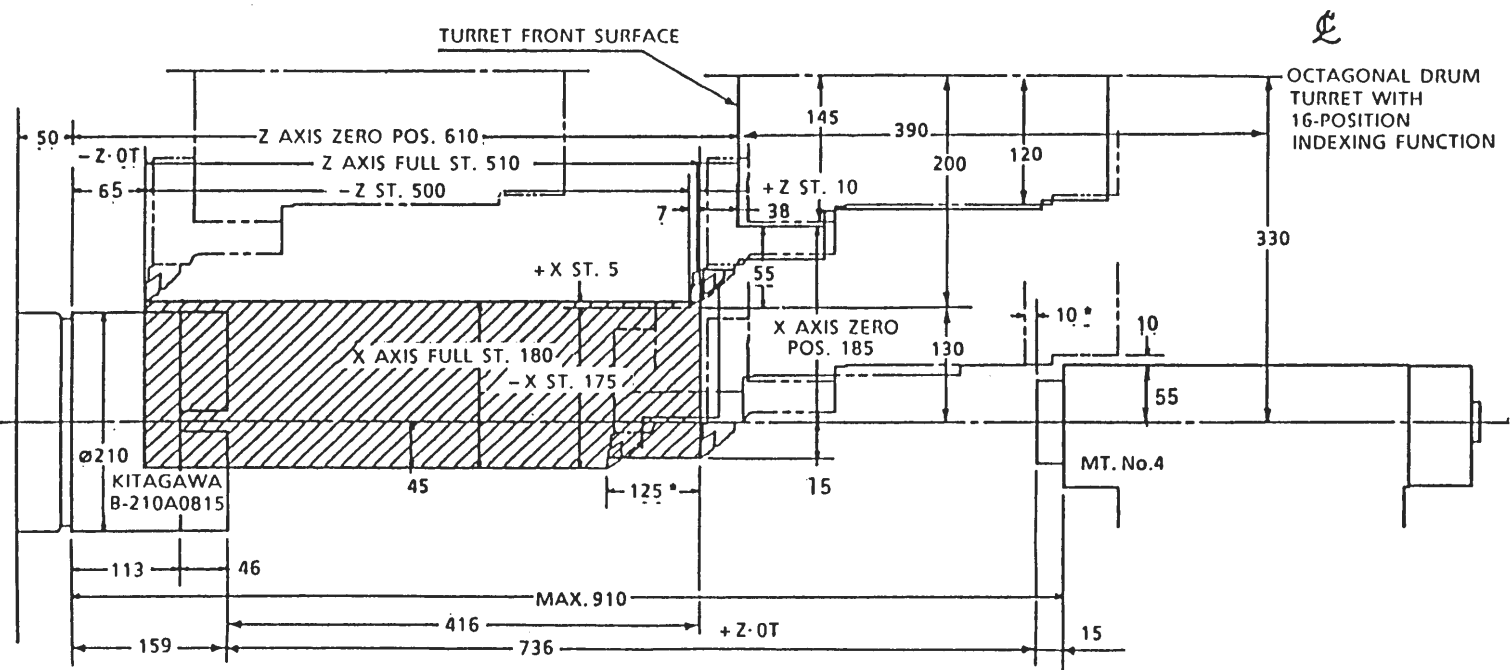
Note) *- and **-marked dimensions shall be respectively 195.7 mm and 480 mm with a manual tailstock.

(2) Octagonal drum turret with 16-position indexing function and 8" chuck

1) For universal type

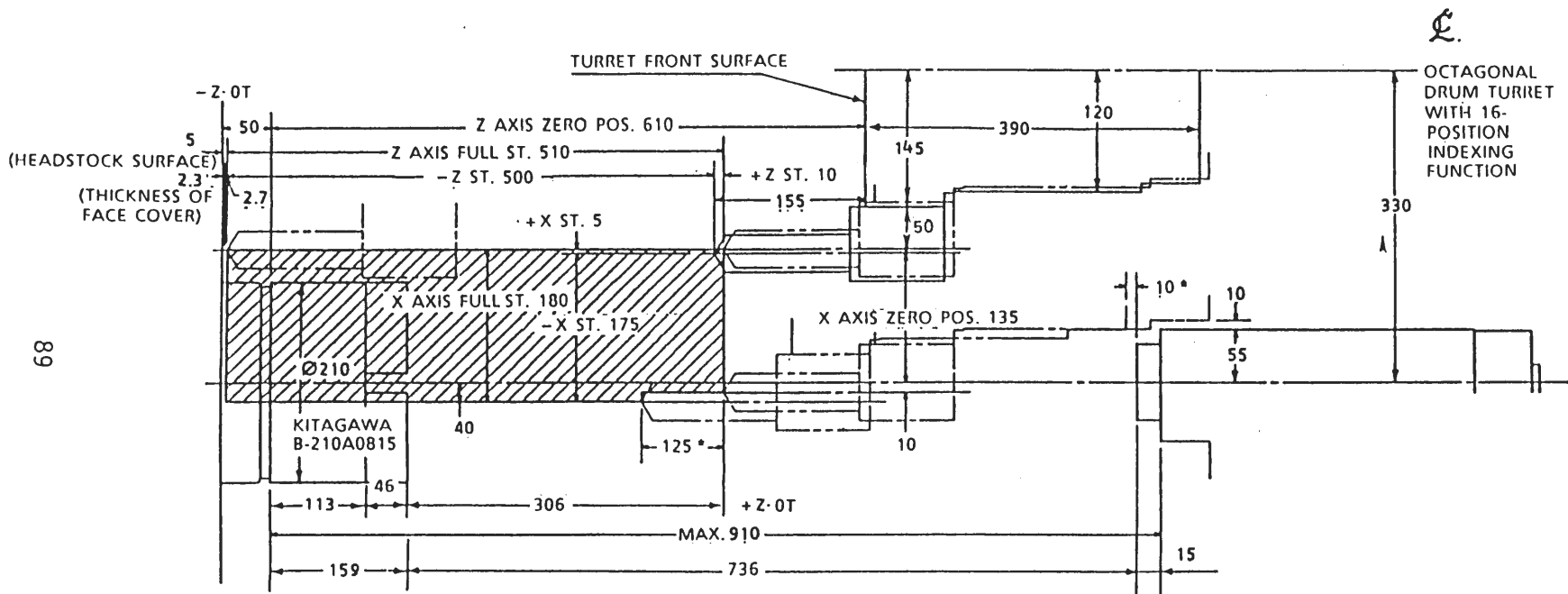
a) Chuck work (with turning tool)

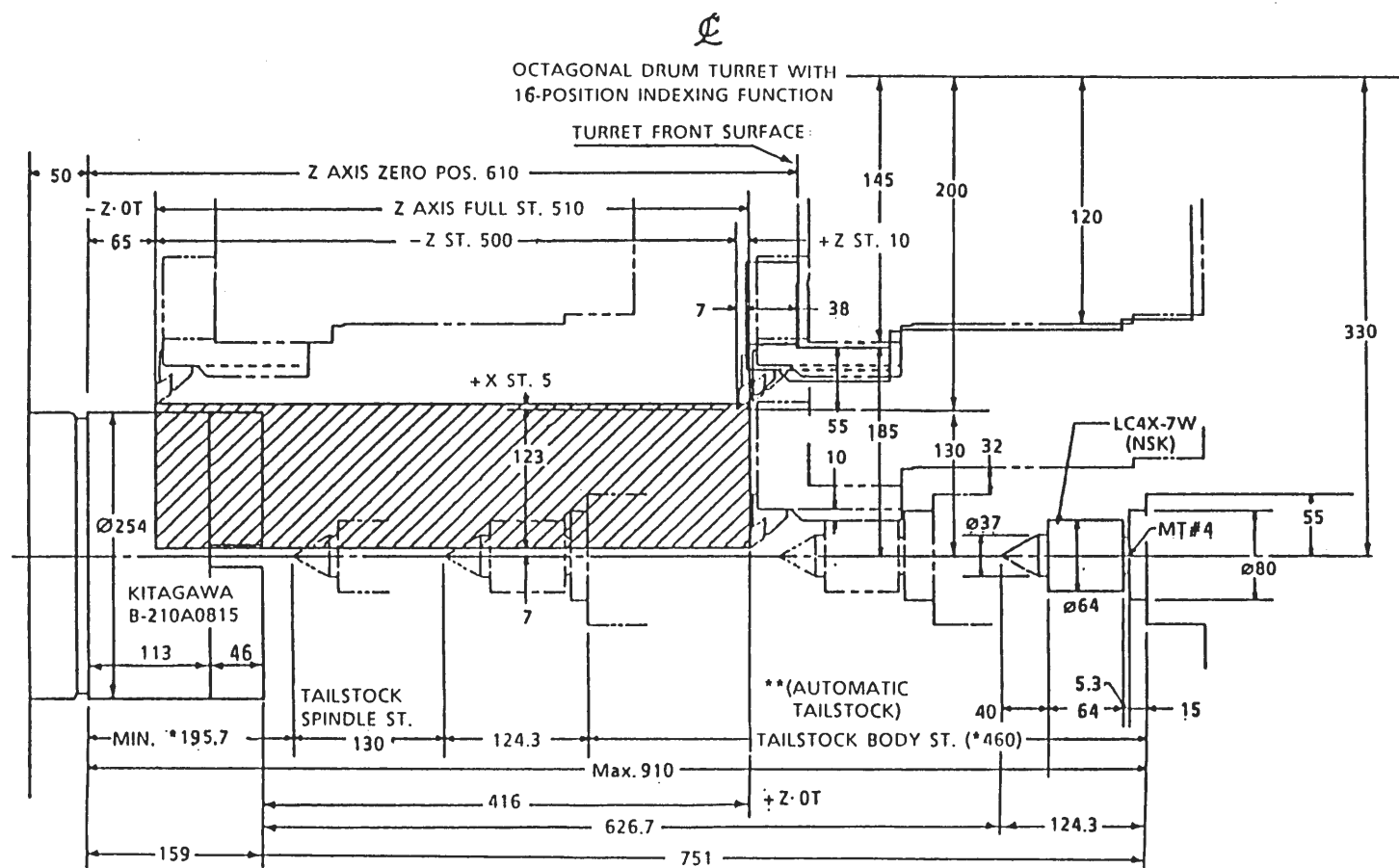
Metric system



b) Chuck work (with boring bar)

Metric system





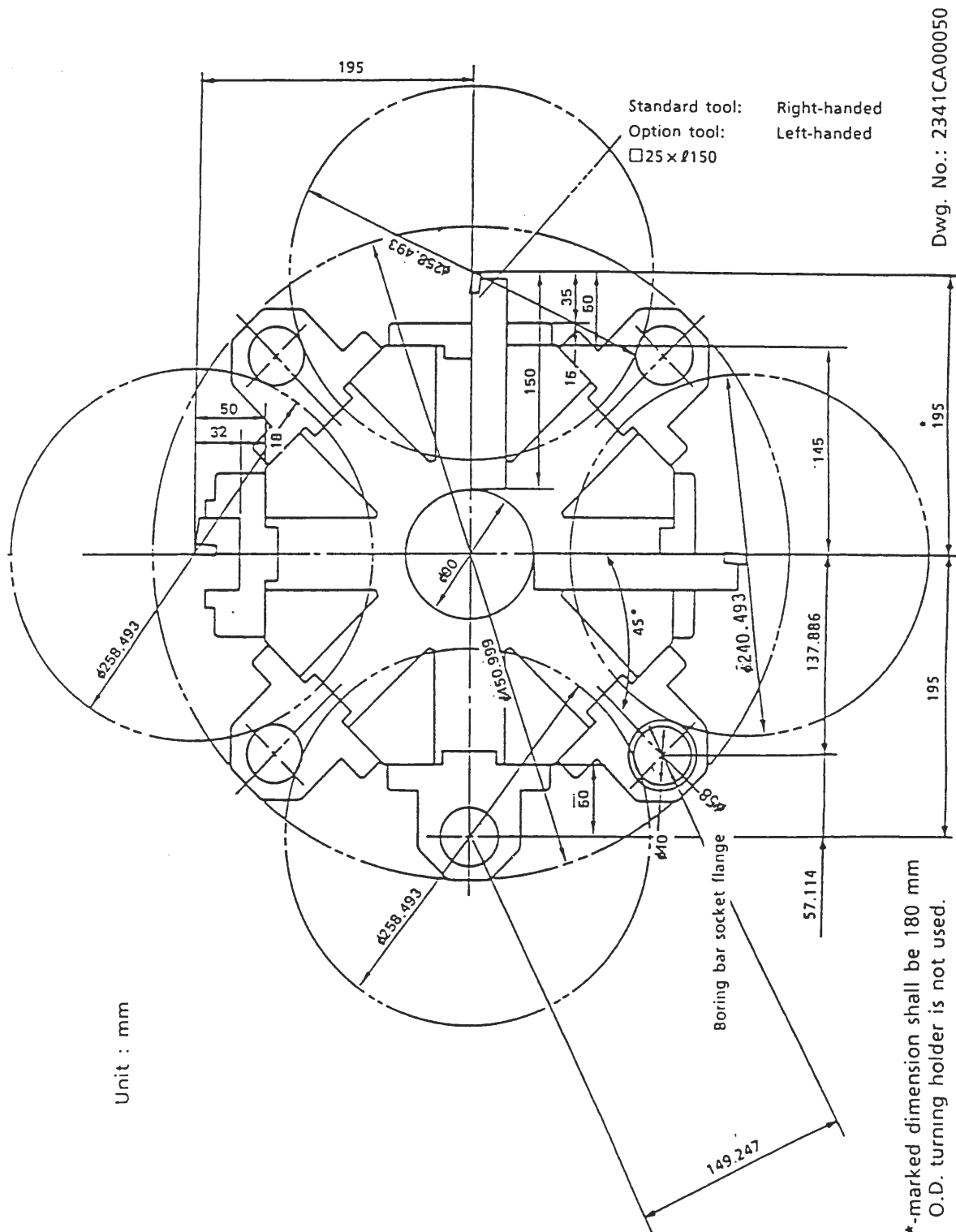
c) Shaft work
Metric system

Note) *- and **-marked dimensions shall be respectively 175.7 mm and 480 mm with a manual tailstock.

6-3 Cutting area

6-3-1 Octagonal drum turret with 10" chuck

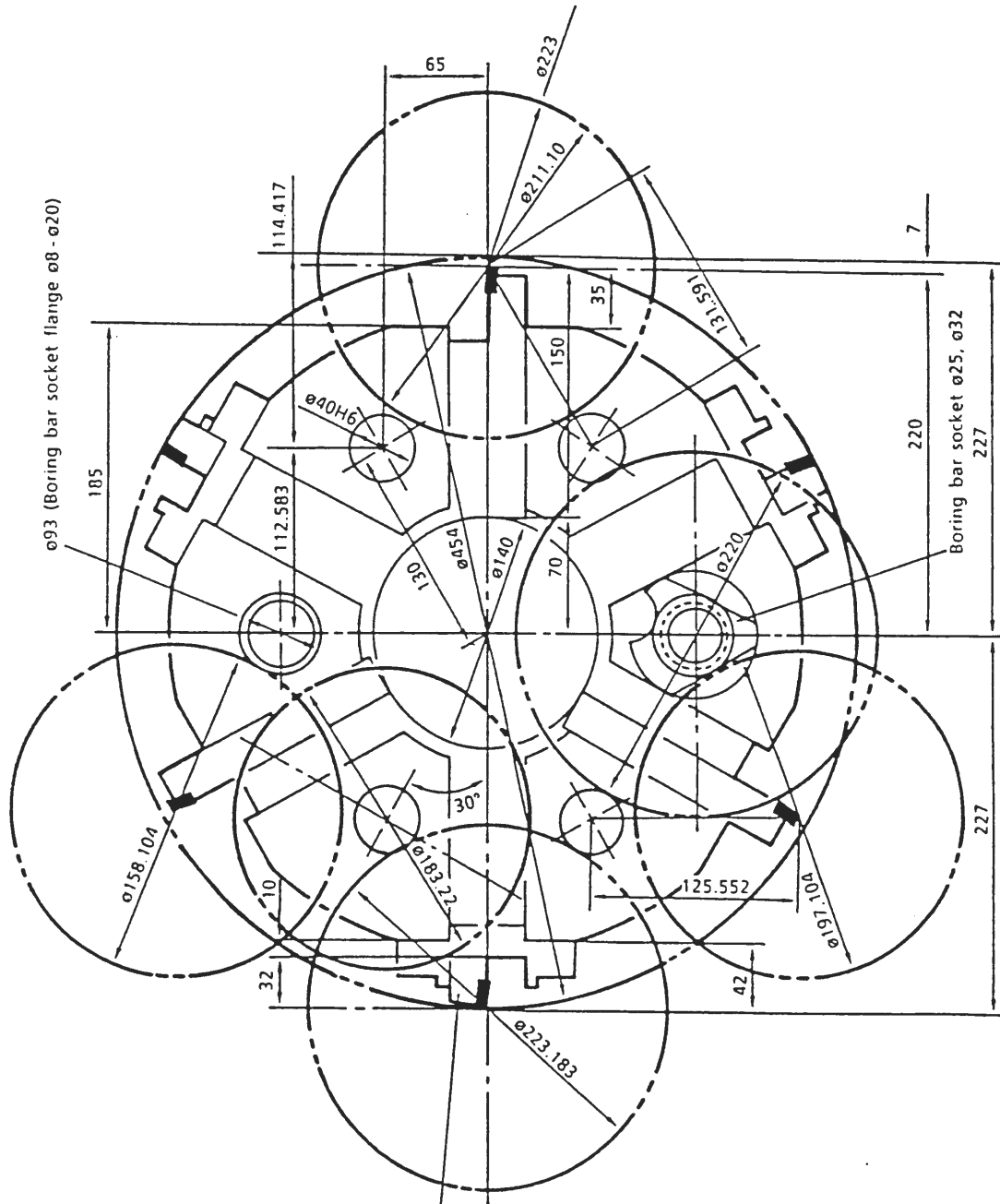
a) Metric system



Note) * -marked dimension shall be 180 mm
O.D. turning holder is not used.

6-3-2 Dodecagonal drum turret

a) Metric system



Dwg. No.: 2341CA00031

Unit : mm

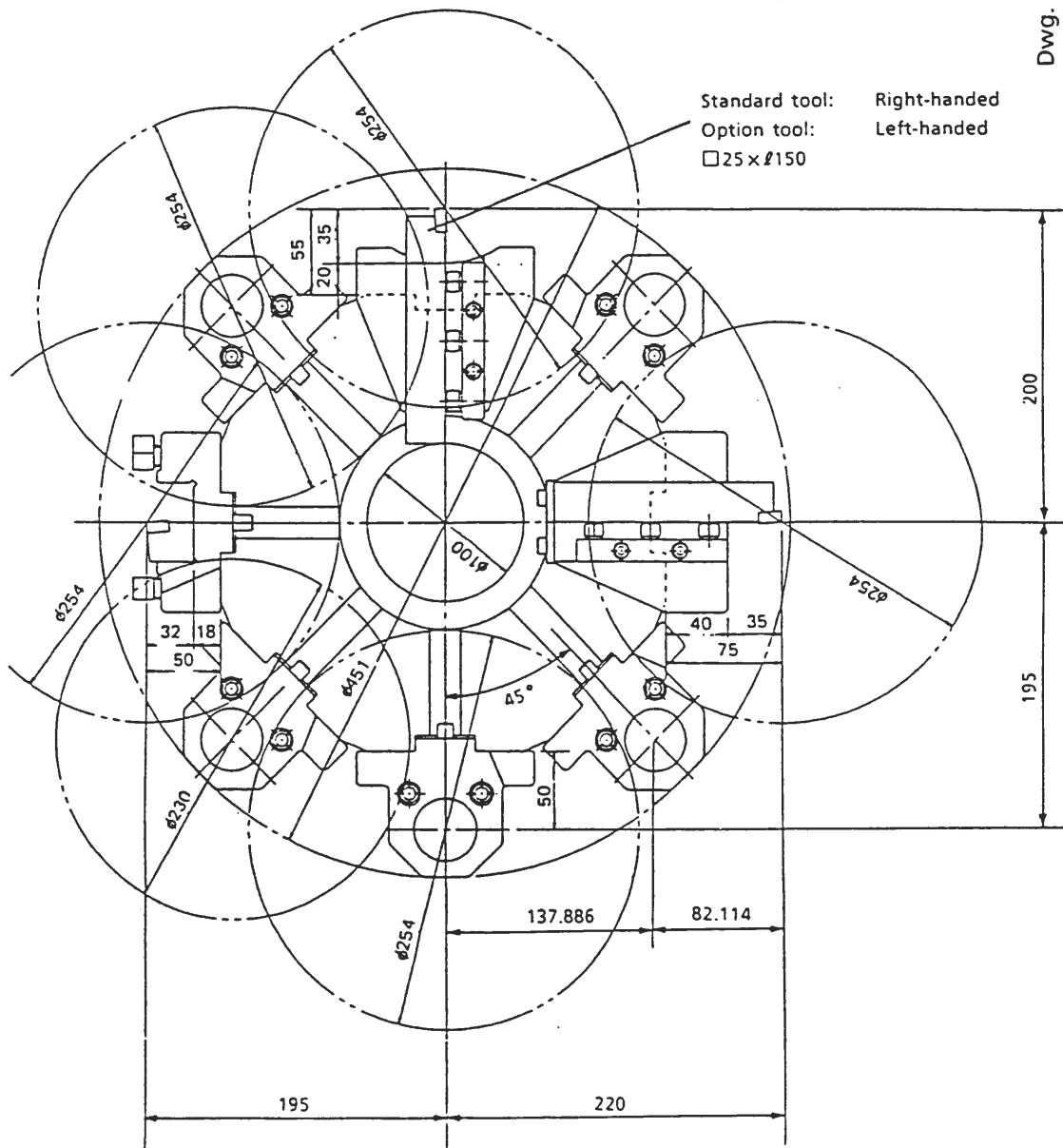
Standard tool : Right-handed
Option tool : Left-handed
□25 × L150

34130024

6-3-3 Octagonal drum turret with 16-position indexing function (for both 8" and 10" chucks)

a) Metric system

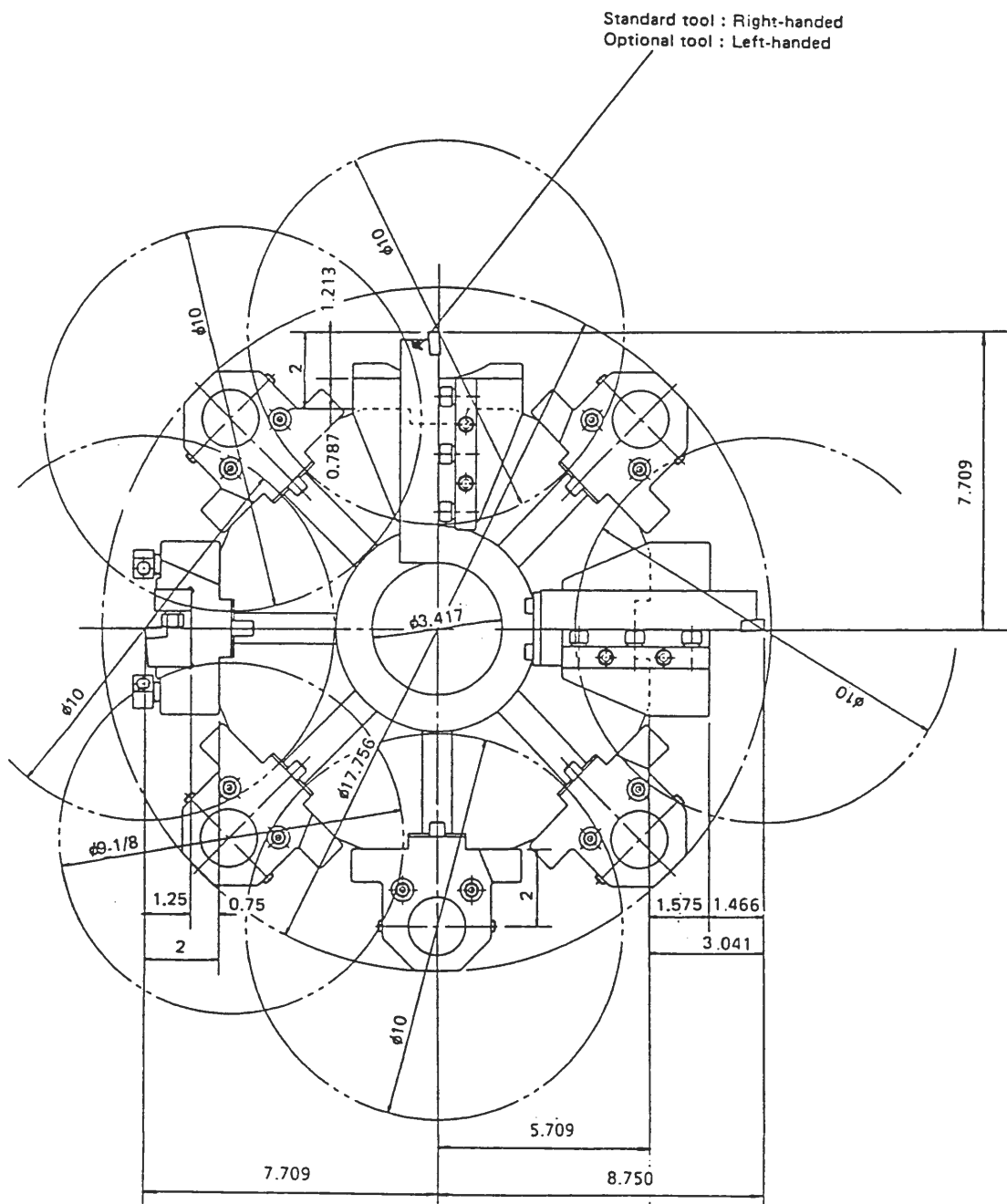
Dwg. No. 2341CA02000



Unit : mm

b) Inch system

Dwg. No.: 2341CA03000

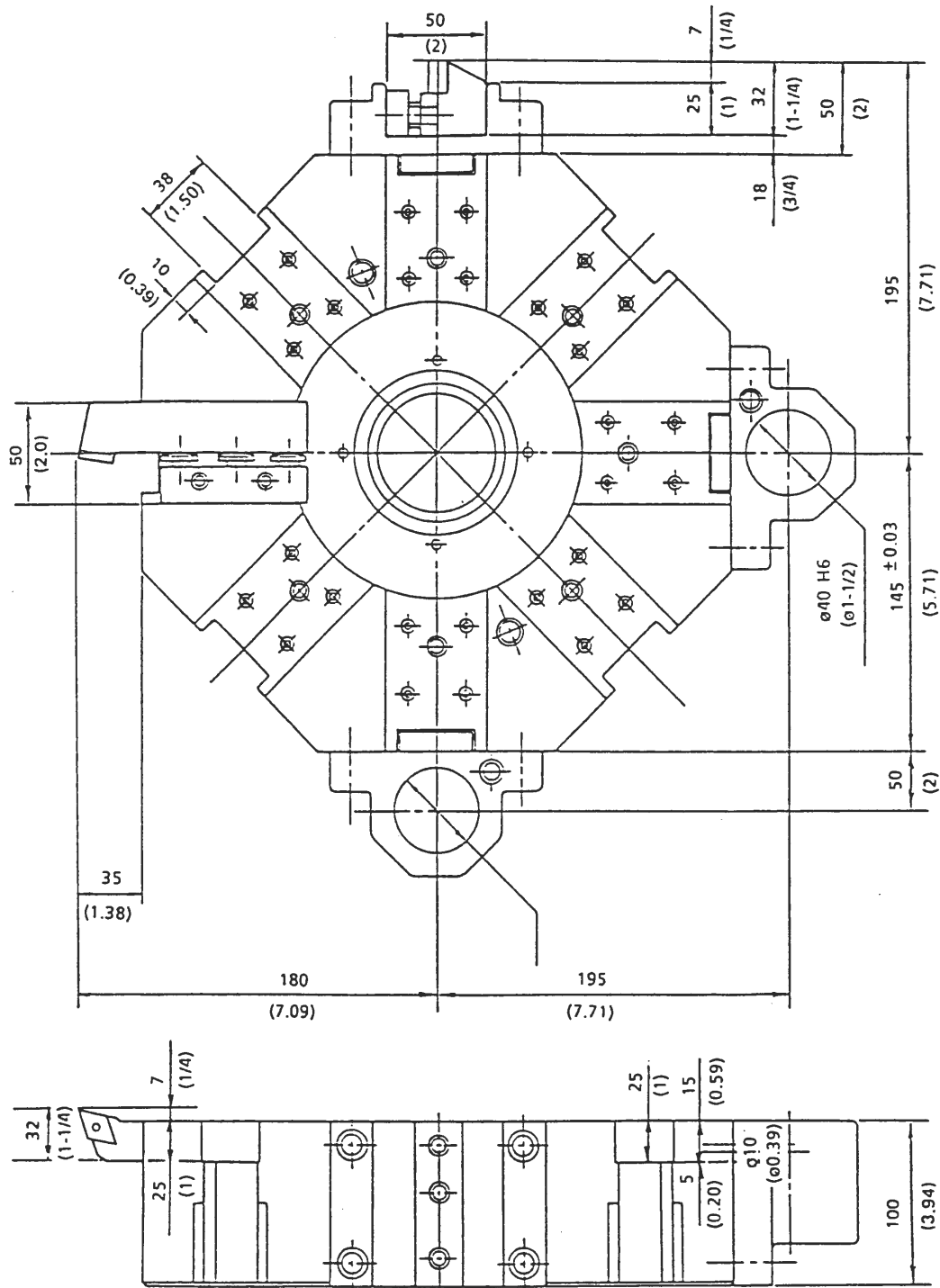


Unit : inch

6-4 Dimensional drawing of turret

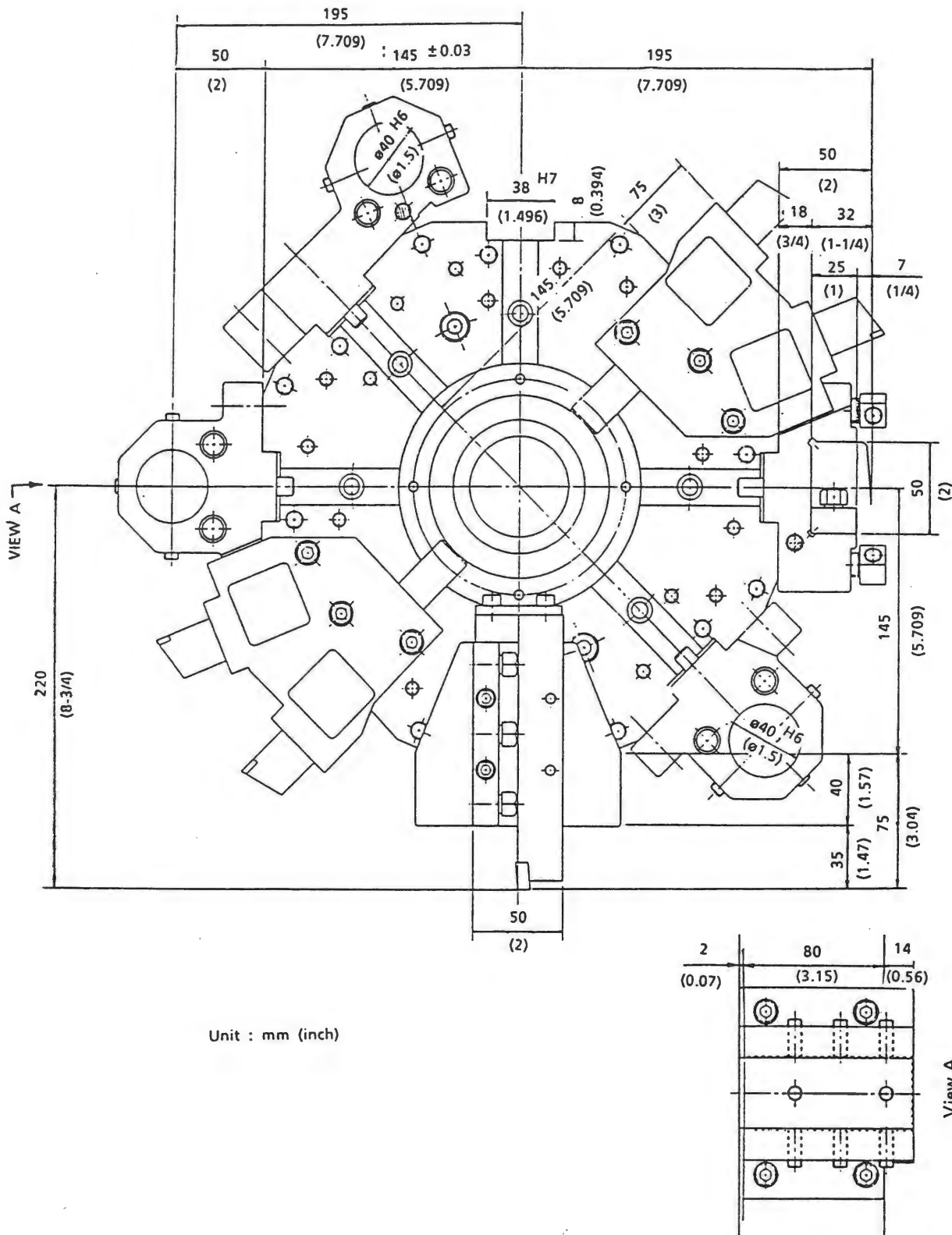
6-4-1 Octagonal drum turret (for both 8" and 10" chucks)

Unit : mm (inch)



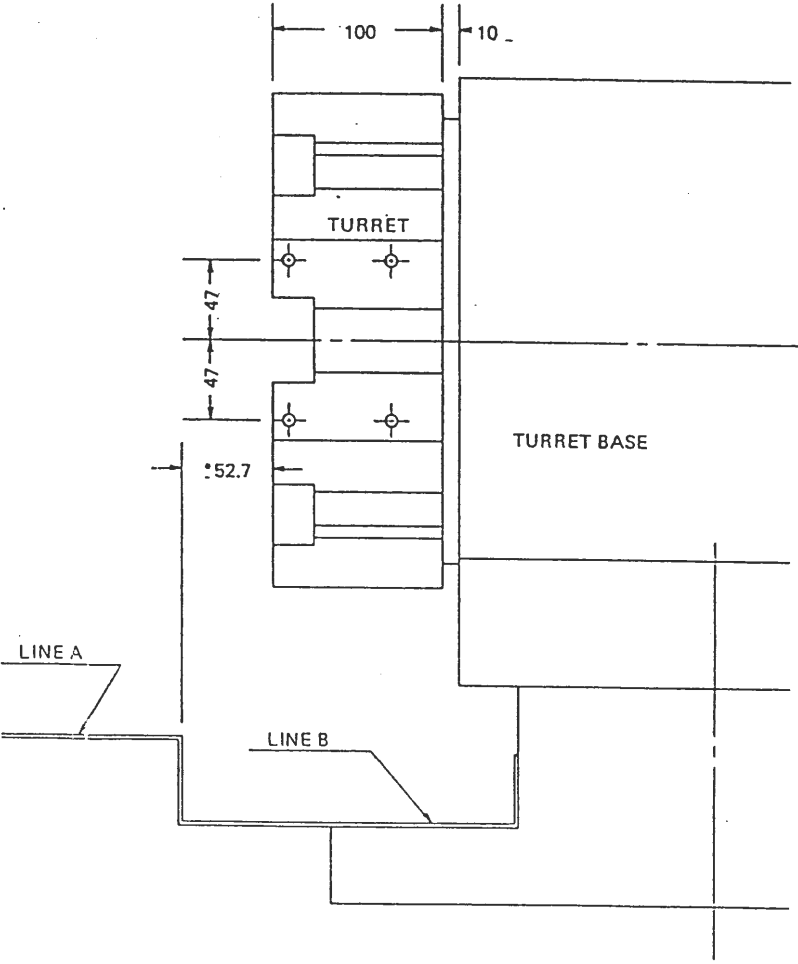
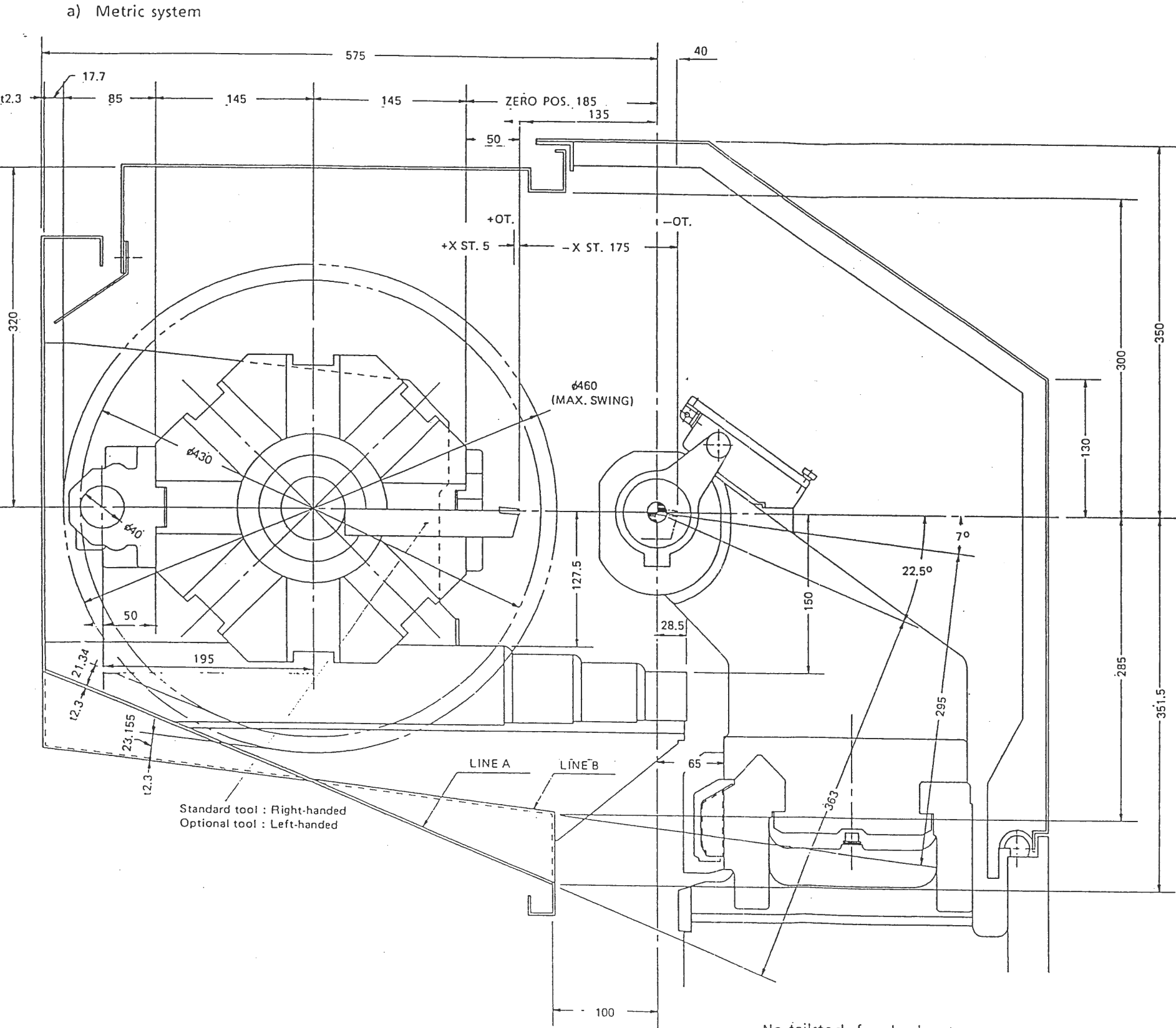
6-4-3 Octagonal drum turret with 16-position indexing function (for both 8" and 10" chucks)

Dwg. No.: 134180TU040



6-5 Relational drawing of turret

6-5-1 Octagonal drum turret with 10" c huck

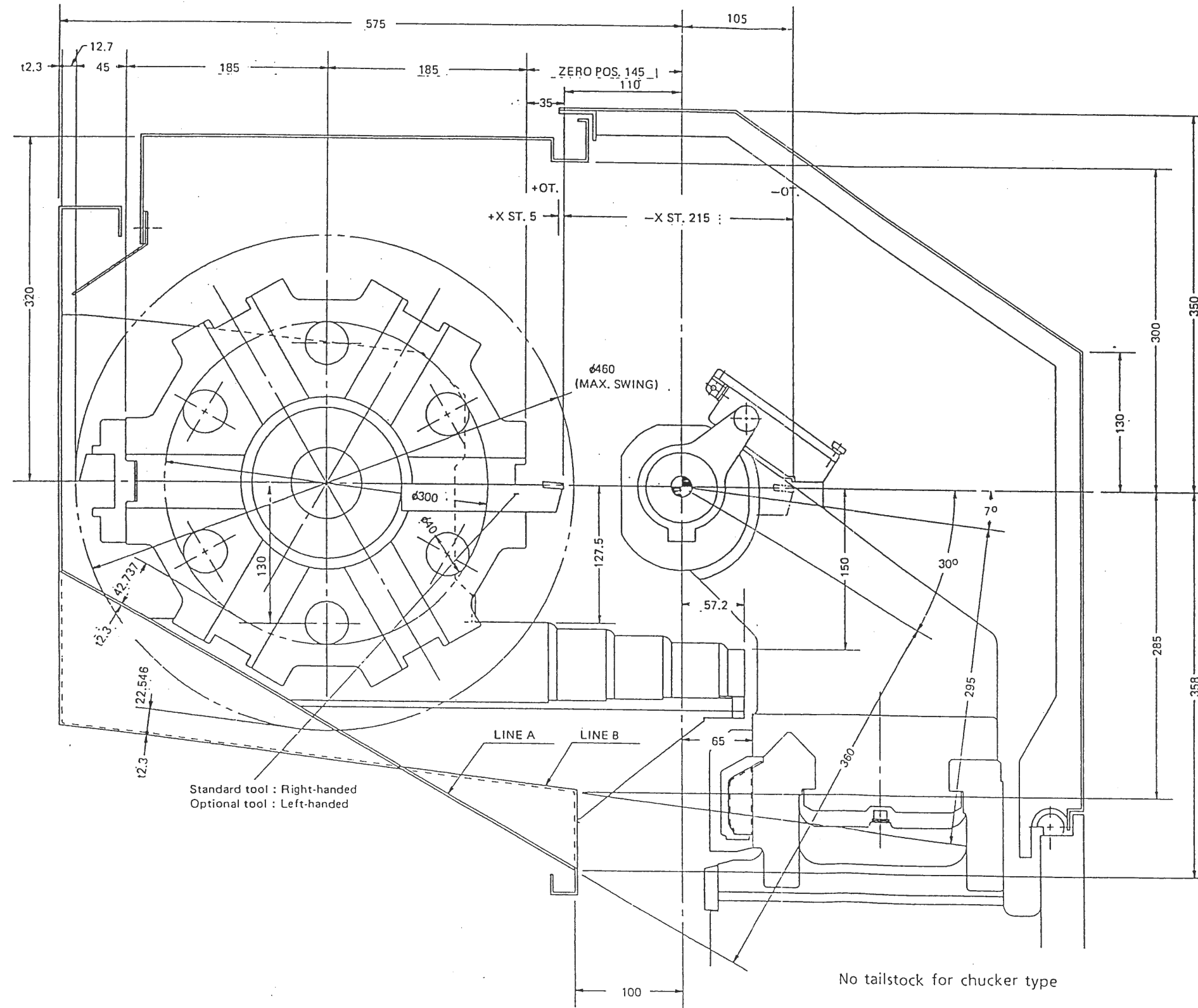


DWG. No. : 2341TA00050

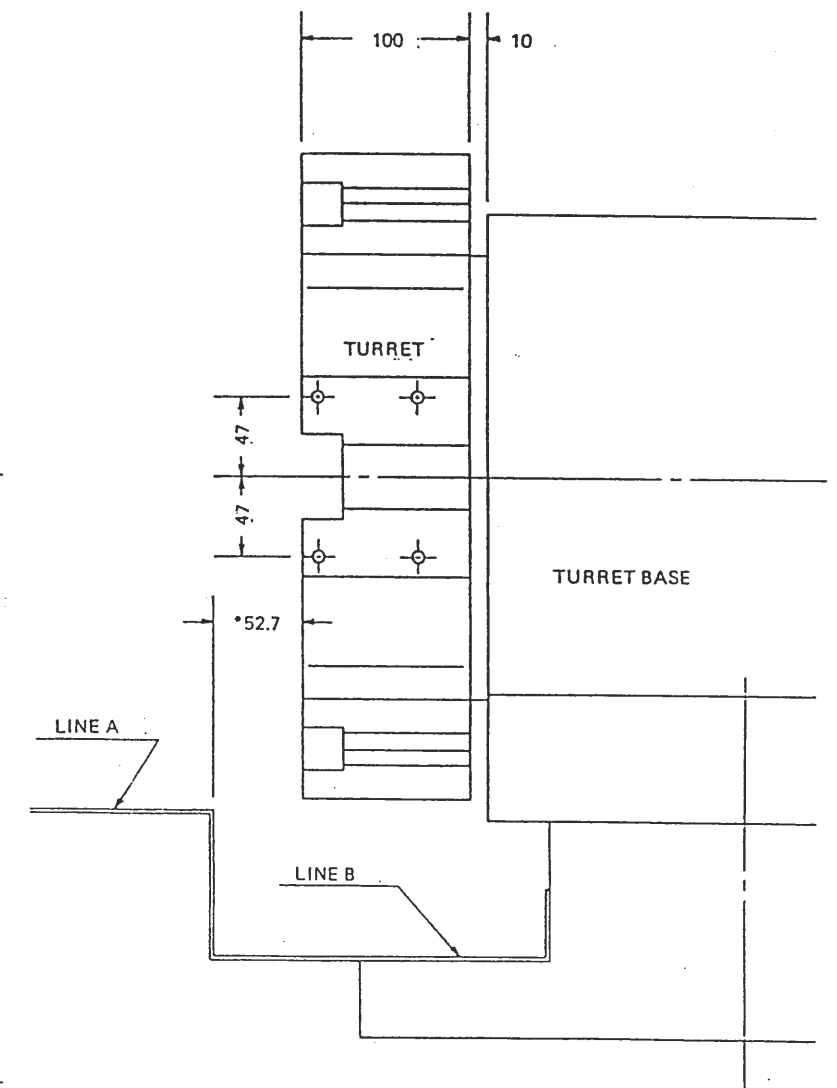
Note: *-marked dimension shall be 47.7 when the turret unclamping.

6-5-2 Dodecagonal drum turret with 8" chuck

a) Metric system



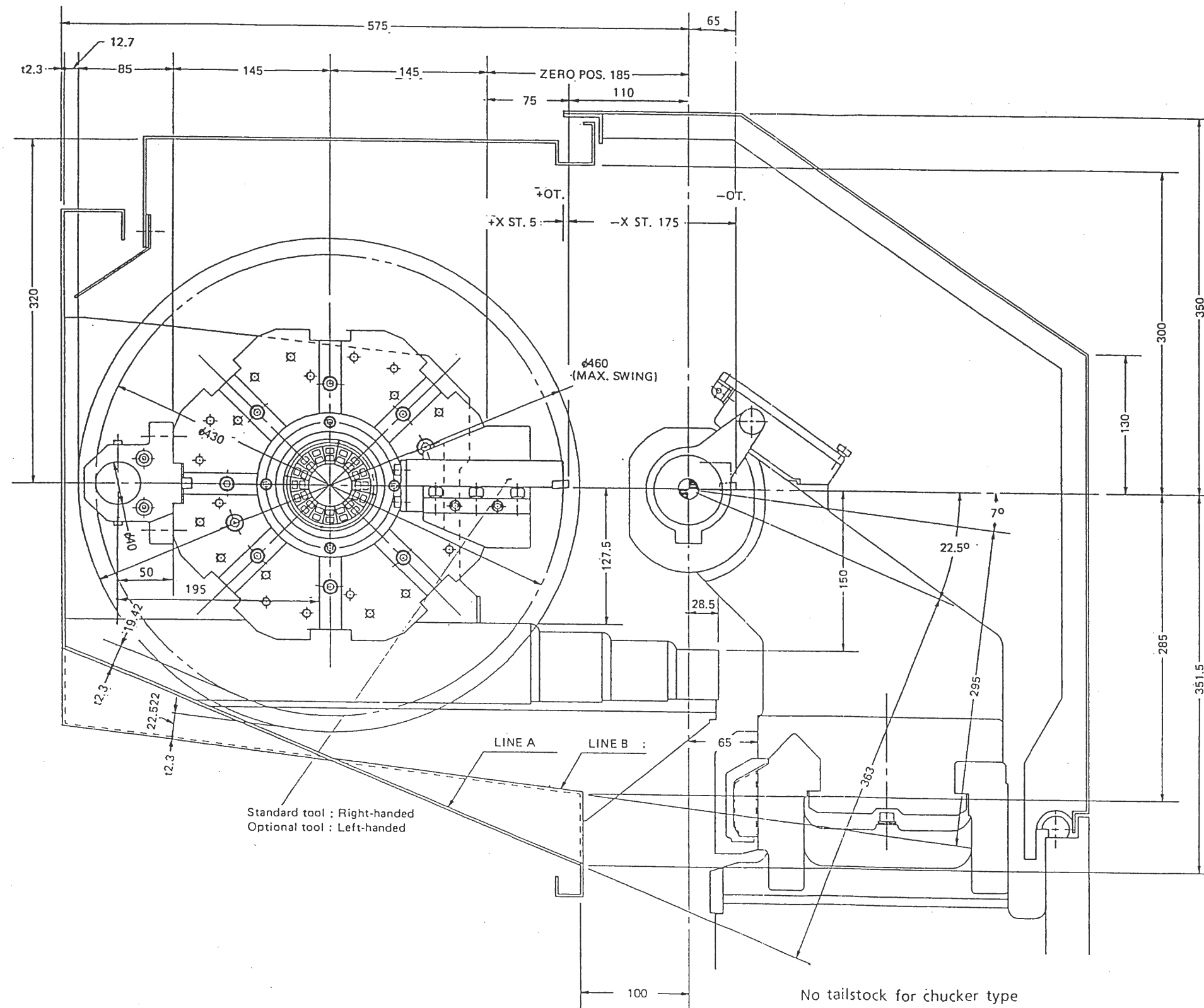
Note: *-marked dimension shall be 47.7 when the turret unclamping.



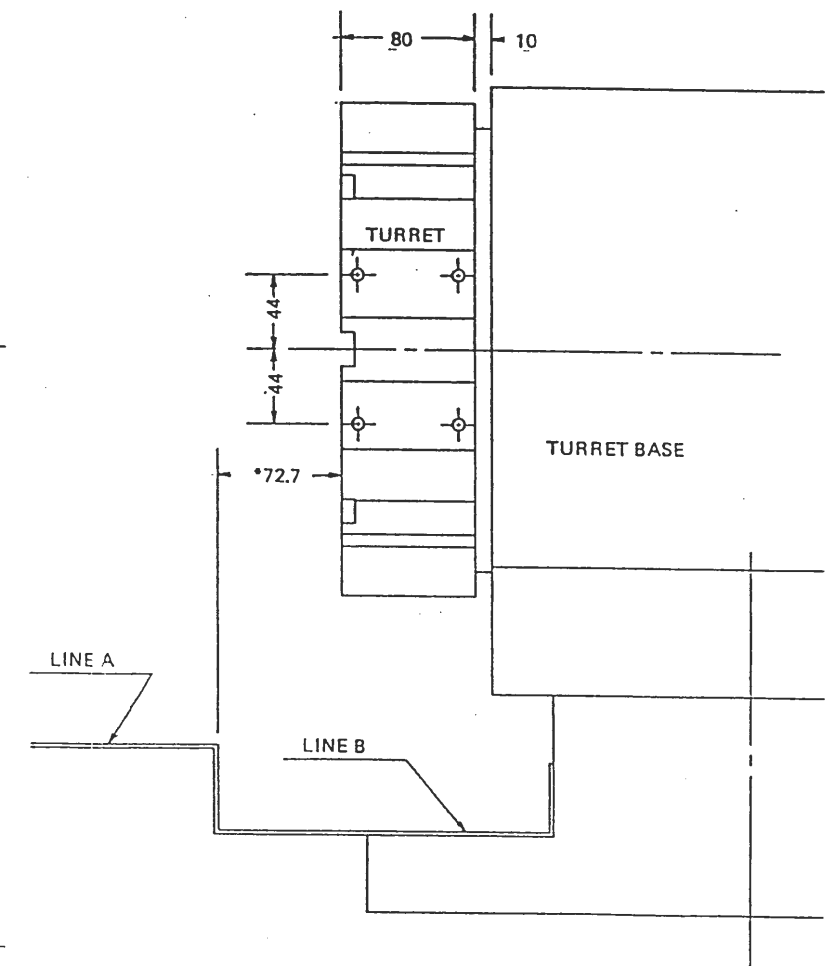
DWG. No. : 2341TA00030

6-5-3 Octagonal drum turret with 16-position indexing function
(for both 8" and 10" chucks)

a) Metric system



Note: *-marked dimension shall be 47.7 when the turret unclamping.

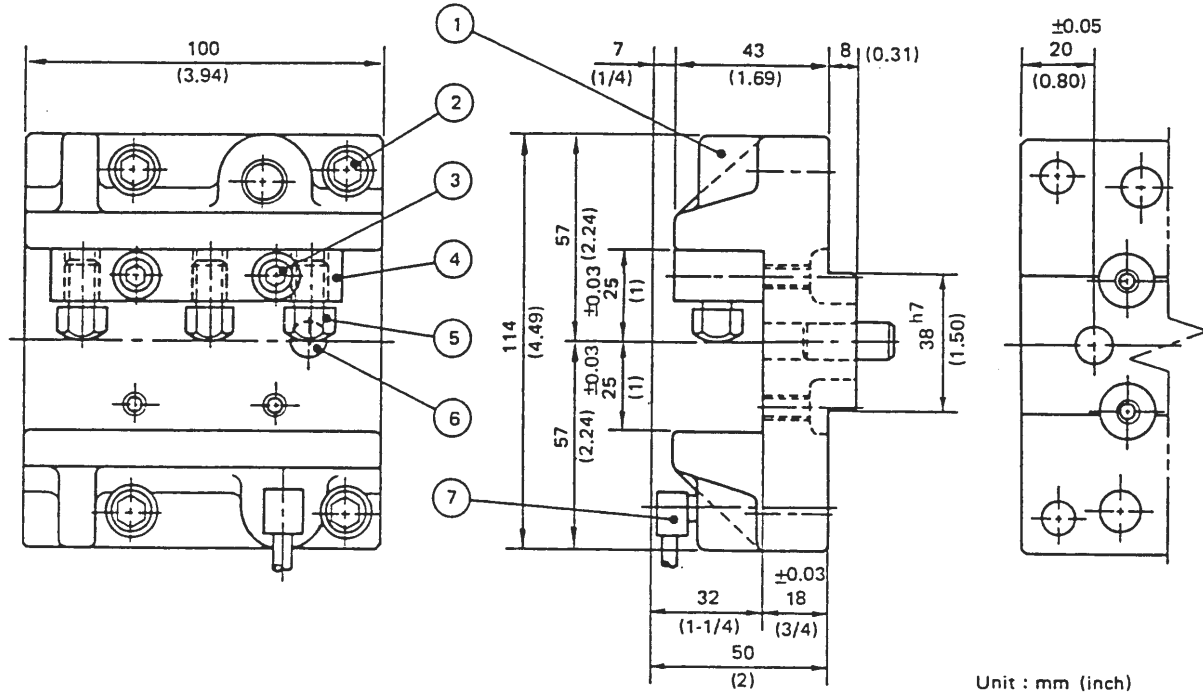


DWG. No. : 2341TA00070

6-6 Tool holder

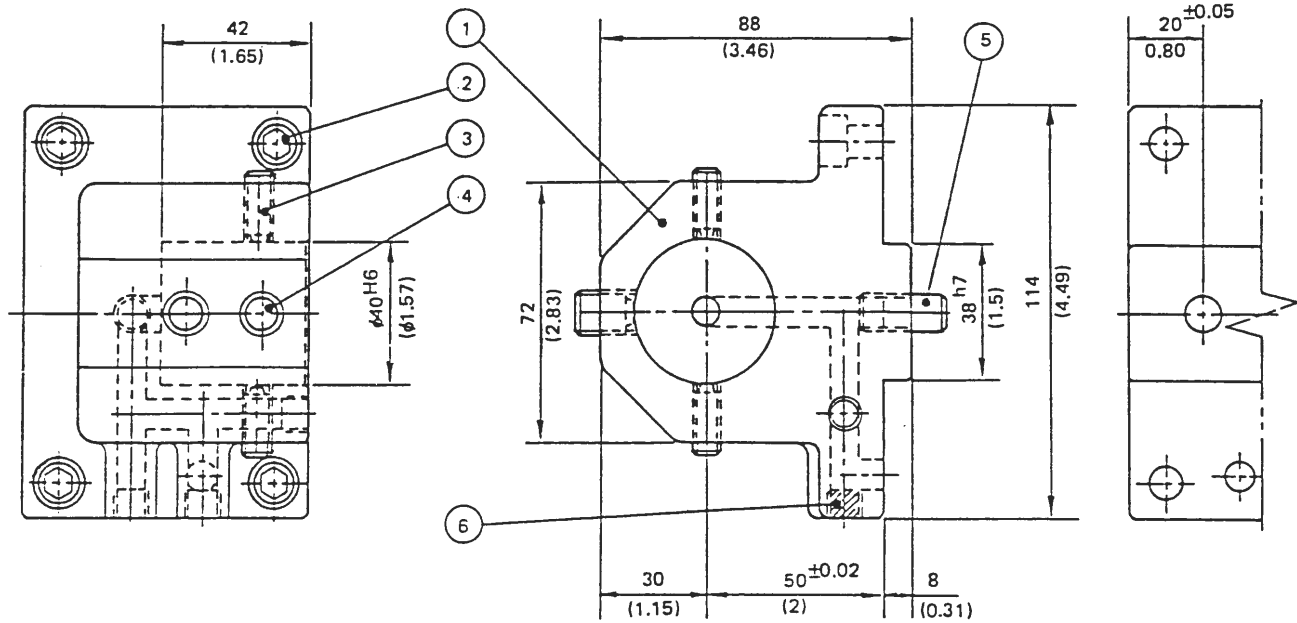
6-6-1 Octagonal drum turret with 8-position indexing function

(1) Facing holder



Unit Code No.	No.	Parts Code No.	Description	Q'ty	Remarks
53418000500 Facing holder (Metric system)	1	23418041090	Facing holder	1	
	2	A06CB080250	Hex. socket head cap screw	4	M8 x 25
	3	A06CB060250	Hex. socket head cap screw	2	M6 x 25
	4	43411558980	Block	1	
	5	4142538640	Bolt	3	
	6	A10010X0250	Straight pin	1	ø10 x 25
	7	H10SF0PH620	Elbow	1	PH6-2
53418010500 Facing holder (Inch system)	1	23418041100	Facing holder	1	
	2	A06CB080250	Hex. socket head cap screw	4	M8 x 25
	3	A06CB060250	Hex. socket head cap screw	2	M6 x 25
	4	43411558980	Block	1	
	5	41421538640	Bolt	3	
	6	A10010X0250	Straight pin	1	ø10 x 25
	7	H10SF0PH620	Elbow	1	PH6-2

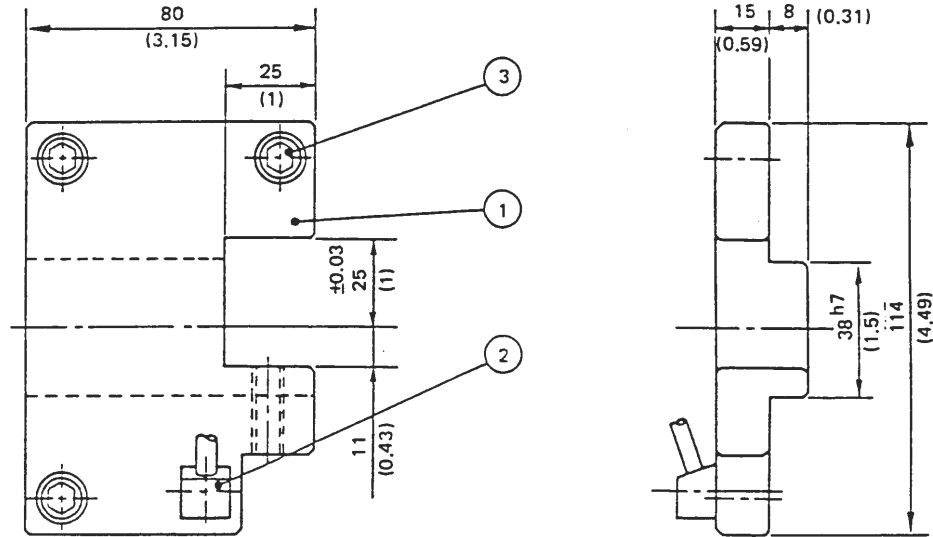
(3) U-drill holder



Unit: mm (inch)

Unit Code No.	No.	Parts Code No.	Description	Q'ty	Remarks
53418000600 U-drill holder (Metric system)	1	23418041110	U-drill holder	1	
	2	A06C8080250	Hex. socket head cap screw	4	M8 × 25
	3	A15A08X0200	Hex. socket set screw	2	M8 × 20 (Dog point)
	4	A15A12X0160	Hex. socket set screw	2	M12 × 16 (Dog point)
	5	A10010X0250	Straight pin	1	ø10 × 25
	6	H3600001580	Hex. socket pipe screw	4	PT1/8
53418010600 U-drill holder (Inch system)	1	23418041120	U-drill holder	1	
	2	A06C8080250	Hex. socket head cap screw	4	M8 × 25
	3	A15A08X0200	Hex. socket set screw	2	M8 × 20 (Dog point)
	4	A15A12X0160	Hex. socket set screw	2	M12 × 16 (Dog point)
	5	A10010X0250	Straight pin	1	ø10 × 25
	6	H3600001580	Hex. socket pipe screw	4	PT1/8

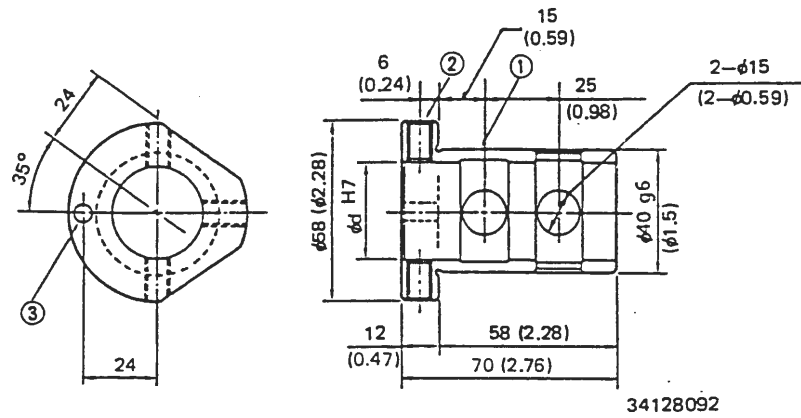
(5) O.D. turning holder (for left-handed tool)



Unit: mm (inch)

Unit Code No.	No.	Parts Code No.	Description	Q'ty	Remarks
53418000800 O.D. turning holder (for left-handed tool) (Metric system)	1	23418041130	Turning holder	1	
	2	H10SF0Pi2Y0	Elbow	1	Pi2Y
	3	A06CB080250	Hex. socket head cap screw	3	M8 x 25
53418010800 O.D. turning holder (for left-handed tool) (Inch system)	1	23418041140	Turning holder	1	
	2	H10SF0Pi2Y0	Elbow	1	Pi2Y
	3	A06CB080250	Hex. socket head cap screw	3	M8 x 25

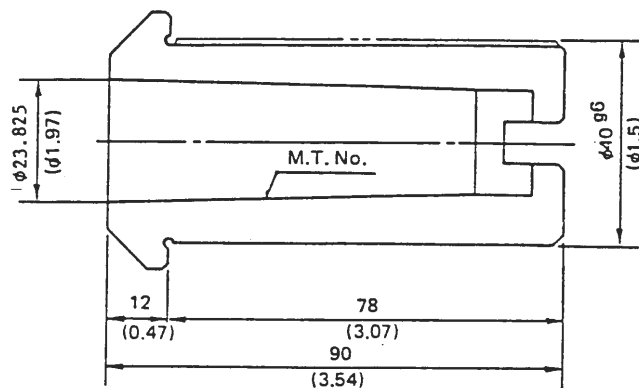
(7) Boring bar socket (for both 8" and 10" chucks)



Unit: mm (inch)

Unit Code No.	No.	Parts Code No.	Description	Q'ty	Remarks
53418001602 Boring bar socket (Metric system)	1	43418041312	Boring bar socket	1	d = ø32 mm
	2	A15808X0100	Hex. socket set screw	3	M8 x 10 (Flat point)
	3	A12006X0120	Spring pin	1	ø6 x L12
53418001702 Boring bar socket (Metric system)	1	43418041322	Boring bar socket	1	d = ø25 mm
	2	A15808X0120	Hex. socket set screw	3	M8 x 12 (Flat point)
	3	A12006X0120	Spring pin	1	ø6 x L12
53418011602 Boring bar socket (Inch system)	1	43418041562	Boring bar socket	1	d = ø1-1/4 in.
	2	A15808X0100	Hex. socket set screw	3	M8 x 10 (Flat point)
	3	A12006X0120	Spring pin	1	ø6 x L12
53418011702 Boring bar socket (Inch system)	1	43418041572	Boring bar socket	1	d = ø1 in.
	2	A15808X0120	Hex. socket set screw	3	M8 x 12 (Flat point)
	3	A12006X0120		1	ø6 x L12

(9) Drill socket (MT) (for both 8" and 10" chucks)

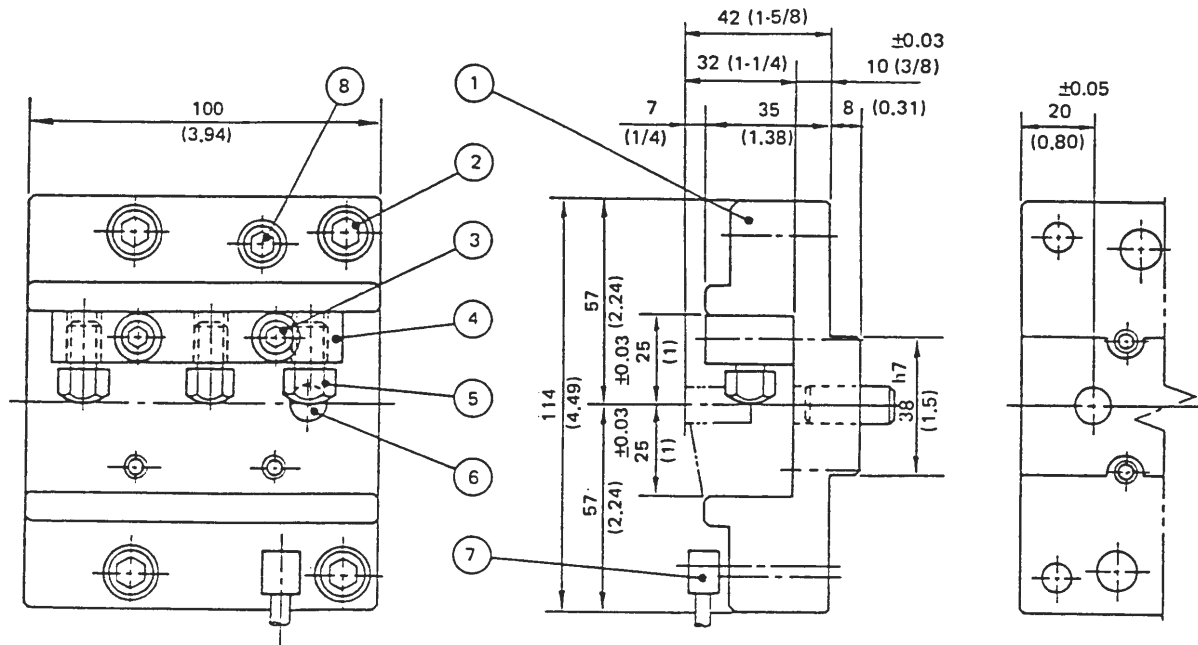


Unit : mm (inch)

Unit Code No.	No.	Parts Code No.	Description	Q'ty	Remarks
53418003100 Drill socket MT No.3 (Metric system)	1	43418041450	Drill socket	1	MT No.3
53418003200 Drill socket MT No.2 (Metric system)	1	43418041460	Drill socket	1	MT No.2
53418003300 Drill socket MT No.1 (Metric system)	1	43418041470	Drill socket	1	MT No.1
53418013100 Drill socket MT No.3 (Inch system)	1	33418041700	Drill socket	1	MT No.3
53418013200 Drill socket MT No.2 (Inch system)	1	33418041710	Drill socket	1	MT No.2
53418013300 Drill socket MT No.1 (Inch system)	1	33418041720	Drill socket	1	MT No.1

6-6-2 Dodecagonal drum turret

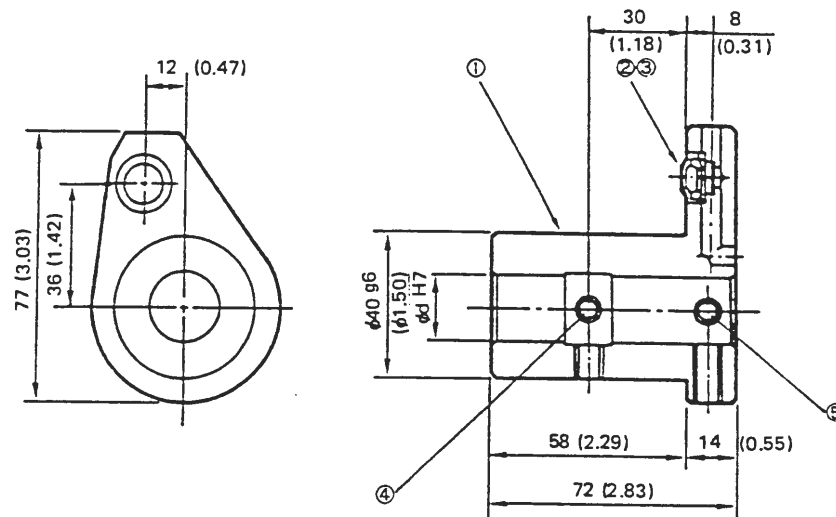
(1) Facing holder



Unit: mm (inch).

Unit Code No.	No.	Parts Code No.	Description	Q'ty	Remarks
53418000201 Facing tool holder (Metric system)	1	23418041031	Facing holder	1	
	2	A06CB080250	Hex. socket head cap screw	4	M8 x 25
	3	A06CB060250	Hex. socket head cap screw	2	M6 x 25
	4	43411558980	Block	1	
	5	41421538640	Bolt	3	
	6	A10010X0250	Straight pin	1	ø10 x 25
	7	HY10SF0PH620	Elbow	1	PH6-2
	8	H3600001540	Hex. socket pipe plug	1	PT1/4
53418010201 Facing tool holder (Inch system)	1	23418041041	Facing holder	1	
	2	A06CB080250	Hex. socket head cap screw	4	M8 x 25
	3	A06CB060250	Hex. socket head cap screw	2	M6 x 25
	4	43411558980	Block	1	
	5	41421538640	Bolt	3	
	6	A10010X0250	Straight pin	1	ø10 x 25
	7	H10SF0PH620	Elbow	1	PH6-2
	8	H3600001540	Hex. socket pipe plug	1	PT1/4

(3) Boring bar sleeve



34128095

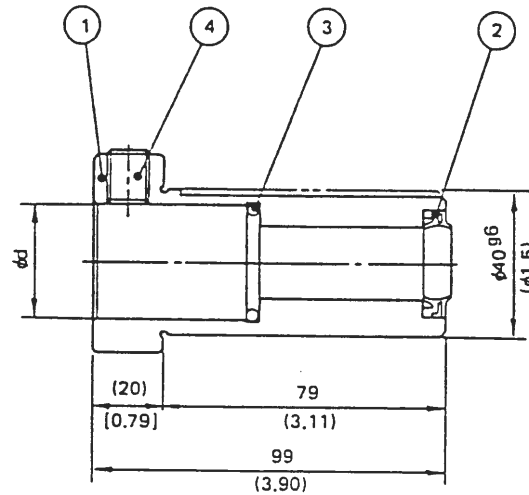
Unit: mm (inch)

Unit Code No.	No.	Parts Code No.	Description	Q'ty	Remarks
53418002502 Boring bar sleeve (Metric system)	1	33418041382	Socket	1	d = $\varnothing$ 20 mm
	2	J04SH000970	Scraper	1	SCR-6.3
	3	41408021340	Bush	1	BsBD1
	4	A15B08X0100	Hex. socket set screw	2	M8 x 10 (Flat point)
	5	A15B08X0160	Hex. socket set screw	2	M8 x 16 (Flat point)
53418002602 Boring bar sleeve (Metric system)	1	33418041392	Socket	1	d = $\varnothing$ 16 mm
	2	J04SH000970	Scraper	1	SCR-6.3
	3	41408021340	Bush	1	BsBD1
	4	A15B08X0120	Hex. socket set screw	2	M8 x 12 (Flat point)
	5	A15B08X0160	Hex. socket set screw	2	M8 x 16 (Flat point)
53418002702 Boring bar sleeve (Metric system)	1	33418041402	Socket	1	d = $\varnothing$ 12 mm
	2	J04SH000970	Scraper	1	SCR-6.3
	3	41408021340	Bush	1	BsBD1
	4	A15B06X0120	Hex. socket set screw	2	M6 x 12 (Flat point)
	5	A15B06X0160	Hex. socket set screw	2	M6 x 16 (Flat point)
53418002802 Boring bar sleeve (Metric system)	1	33418041412	Socket	1	d = $\varnothing$ 10 mm
	2	J04SH000970	Scraper	1	SCR-6.3
	3	41408021340	Bush	1	BsBD1
	4	A15B06X0120	Hex. socket set screw	2	M6 x 12 (Flat point)
	5	A15B06X0160	Hex. socket set screw	2	M6 x 16 (Flat point)
53418002902 Boring bar sleeve (Metric system)	1	33418041422	Socket	1	d = $\varnothing$ 8 mm
	2	J04SH000970	Scraper	1	SCR-6.3
	3	41408021340	Bush	1	BsBD1
	4	A15B06X0120	Hex. socket set screw	2	M6 x 12 (Flat point)
	5	A15B06X0160	Hex. socket set screw	2	M6 x 16 (Flat point)

(4) Drill socket (MT)

Refer to "(9) Drill socket (MT)" in "12-2-1 Octagonal drum turret with 8-position indexing function"

(5) U-drill socket

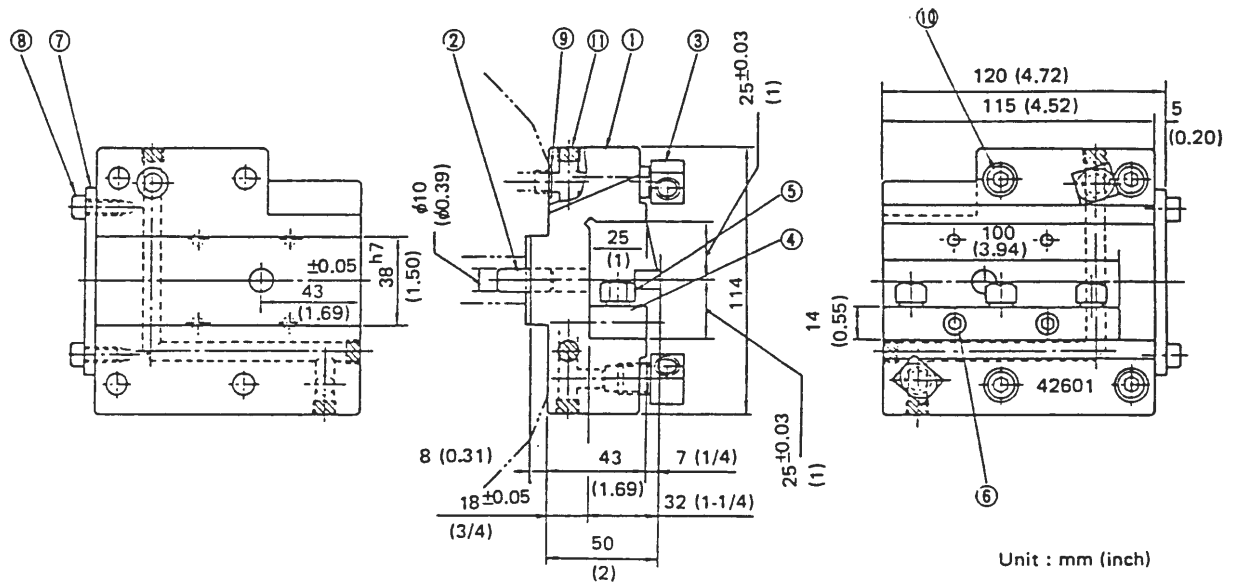


Unit: mm (inch)

Unit Code No.	No.	Parts Code No.	Description	Q'ty	Remarks
53418003701 U-drill socket (Metric system)	1	33418041512	U-drill socket	1	d = $\varnothing 32$ mm
	2	J04SH001360	Scraper	1	SCB-18
	3	J2600P02600	O-ring	1	P26
	4	A15B12X0160	Hex. socket set screw	1	M12 x 16 (Flat point)
53418003801 U-drill socket (Metric system)	1	33418041522	U-drill socket	1	d = $\varnothing 25$ mm
	2	J04SH001360	Scraper	1	SCB-18
	3	J2200P02600	O-ring	1	P22
	4	A15B12X0200	Hex. socket set screw	1	M12 x 20 (Flat point)
53418003901 U-drill socket (Metric system)	1	33418041532	U-drill socket	1	d = $\varnothing 20$ mm
	2	J04SH001360	Scraper	1	SCB-18
	3	J2600P01600	O-ring	1	P16
	4	A15B12X0200	Hex. socket set screw	1	M12 x 20 (Flat point)
53418013701 U-drill socket (Inch system)	1	33418041761	U-drill socket	1	d = $\varnothing 1\text{-}1/4$ in.
	2	J04SH001360	Scraper	1	SCB-18
	3	J2600P02600	O-ring	1	P26
	4	A15B12X0160	Hex. socket set screw	1	M12 x 16 (Flat point)
53418013801 U-drill socket (Inch system)	1	33418041772	U-drill socket	1	d = $\varnothing 1$ in.
	2	J04SH001360	Scraper	1	SCB-18
	3	J2600P02200	O-ring	1	P22
	4	A15B12X0200	Hex. socket set screw	1	M12 x 20 (Flat point)
53418013901 U-drill socket (Inch system)	1	33418041782	U-drill socket	1	d = $\varnothing 3/4$ mm
	2	J04SH001360	Scraper	1	SCB-18
	3	J2600P01600	O-ring	1	P16
	4	A15B12X0200	Hex. socket set screw	1	M12 x 20 (Flat point)

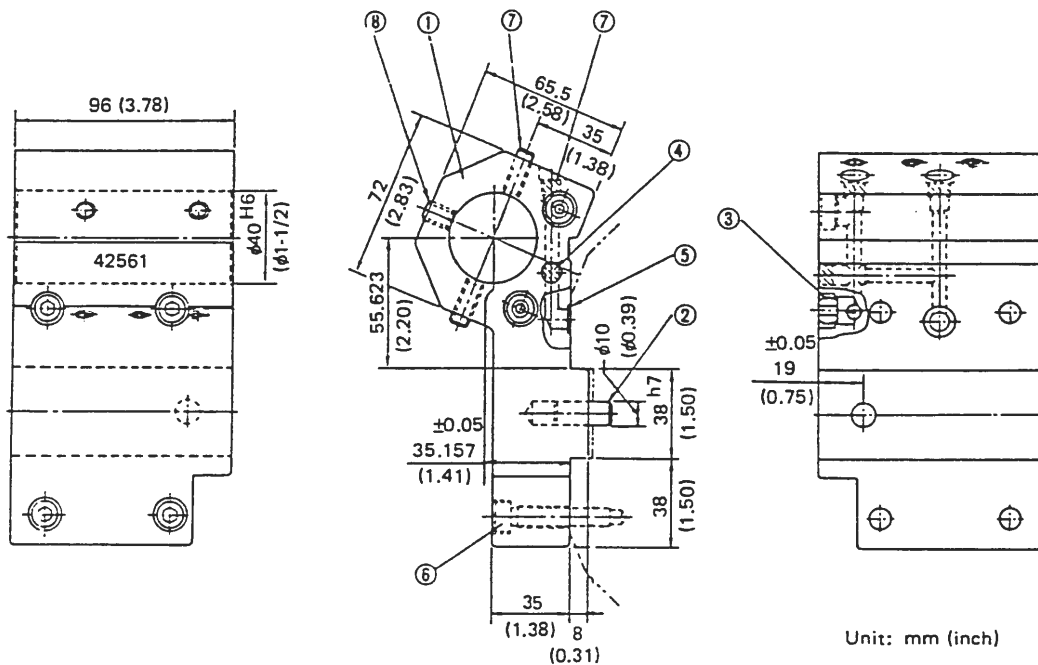
6-6-3 Octagonal drum turret with 16-position indexing function (for both 8" and 10" chucks)

(1) Facing holder



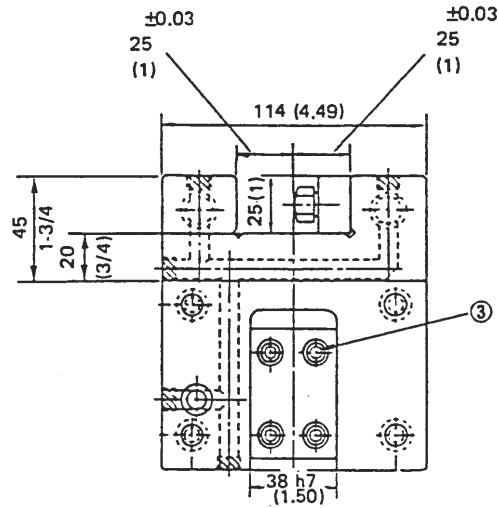
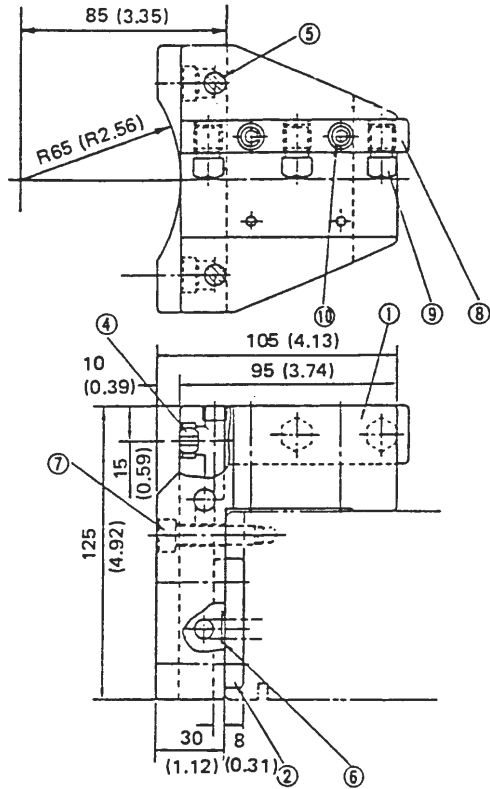
Unit Code No.	No.	Parts Code No.	Description	Q'ty	Remarks
53418004800 Facing holder (Metric system)	1	23418042601	Holder	1	
	2	A10010X0250	Straight pin	1	ø10 × 25
	3	H10SF0PH620	Elbow	2	PH6-2
	4	43418042830	Block	1	
	5	41421538640	Bolt	3	
	6	A06CB060300	Hex. socket head cap screw	2	M6 × 30
	7	43418042810	Plate	1	
	8	A06CB060160	Hex. socket head cap screw	2	M6 × 16
	9	J2600P01000	O-ring	1	P-10
	10	A06CB080500	Hex. socket head cap screw	4	M8 × 50
	11	H3600001580	Hex. socket head cap screw	3	PT 1/8
53418014800 Facing holder (Inch system)	1	23418042901	Holder	1	
	2	A10010X0250	Straight pin	1	ø10 × 25
	3	H10SF0PH620	Elbow	2	PH6-2
	4	43418042830	Block	1	
	5	41421538640	Bolt	3	
	6	A06CB060300	Hex. socket head cap screw	2	M6 × 30
	7	43418042810	Plate	1	
	8	A06CB060160	Hex. socket head cap screw	2	M6 × 16
	9	J2600P01000	O-ring	1	P-10
	10	A06CB080500	Hex. socket head cap screw	4	M8 × 50
	11	H3600001580	Hex. socket head cap screw	3	PT 1/8

(3) Boring bar holder (II)



Unit Code No.	No.	Parts Code No.	Description	Q'ty	Remarks
53418004700 Boring bar holder (II) (Metric system)	1	23418042561	Holder	1	
	2	A10010X0250	Straight pin	1	ø10 × 25
	3	E000PB4E010	Nozzle	2	PB4E01
	4	H3600001S80	Hex. socket pipe plug	4	PT 1/8
	5	J2600P01000	O-ring	1	P-10
	6	A06CB080400	Hex. socket head cap screw	4	M8 × 40
	7	A15A08X0200	Hex. socket head set screw	6	M8 × 20 (Dog point)
	8	A15A08X0120	Hex. socket head set screw	2	M8 × 12 (Dog point)
53418014700 Boring bar holder (II) (Inch system)	1	23418042941	Holder	1	
	2	A10010X0250	Straight pin	1	ø10 × 25
	3	E000PB4E010	Nozzle	2	PB4E01
	4	H3600001S80	Hex. socket pipe plug	4	PT 1/8
	5	J2600P01000	O-ring	1	P-10
	6	A06CB080400	Hex. socket head cap screw	4	M8 × 40
	7	A15A08X0200	Hex. socket head set screw	6	M8 × 20 (Dog point)
	8	A15A08X0120	Hex. socket head set screw	2	M8 × 12 (Dog point)

(9) O.D. turning holder (II)



Unit : mm (inch)

Unit Code No.	No.	Parts Code No.	Description	Q'ty	Remarks
53418005000 O.D. turning holder (II) (Metric system)	1	13418042590	Holder	1	
	2	43418042840	Key	1	
	3	A06CB060200	Hex. socket head cap screw	4	M6 × 20
	4	E000PB4E010	Nozzle	2	PB4E01
	5	H3600001580	Hex. socket pipe plug	5	PT 1/8
	6	J2600P01000	O-ring	1	P-10
	7	A06CB080250	Hex. socket head cap screw	4	M8 × 35
	8	43418042830	Block	1	
	9	41421538640	Bolt	3	
	10	A06CB060300	Hex. socket head cap screw	2	M6 × 30
53418005000 O.D. turning holder (II) (Inch system)	1	13418042980	Holder	1	
	2	43418042840	Key	1	
	3	A06CB060200	Hex. socket head cap screw	4	M6 × 20
	4	E000PB4E010	Nozzle	2	PB4E01
	5	H3600001580	Hex. socket pipe plug	5	PT 1/8
	6	J2600P01000	O-ring	1	P-10
	7	A06CB080250	Hex. socket head cap screw	4	M8 × 35
	8	43418042830	Block	1	
	9	41421538640	Bolt	3	
	10	A06CB060300	Hex. socket head cap screw	2	M6 × 30

Unit Code No.	No.	Description	Q'ty	Remarks
53418015100 Block tool holder (Inch system)	1	Support	2	880 885311N757
	2	Screw	2	M6 x 30-12.9 (JISB1176)
	3	Draw bar	2	5461 015-01
	4	O-ring	2	5461 010-01
	5	Spring	2	5561 001-10
	6	O-ring	2	SS1586 15.3 x 2.4
	7	Piston	2	5695 010-02
	8	Circlip	2	SgH SS1582 20
	9	Cover	2	5549 070-01
	10	Screw	8	MF65 4 x 8-10.9
	11	O-ring	2	SS1586 11.3 x 2.4
	12	Screw	2	SS19 020-05
	13	Wedge	2	5532 050-01
	14	Pin	2	5552 027-01
	15	Screw	4	M8 x 30-12.9 (JISB1176)
	16	O-ring	2	P10 (JISB2401)
	17	Coolant ball	2.	PBA4E01 (I.K.O)
	18	Wrench		880 BT25-TQ-07
	19	Plug	1	M6 x 6 (JISB1177)
	20	Plug	1	5643 011-01
	21	Pin	1	880 810110R975-4
	22	Screw	1	M6 x 30-10.9 (JISB1176)

M code	Function	Machine type					
		QT8N (147)	QT15N/18N (341)	QT28N/30N (342)	QT35N/40N (148)	QT8N SP (343)	QT15N/18N SP (344)
M27	Robot service 8						
M28	Robot service 9						
M29	Robot service 10						
M30	Program end	□	□	□	□	□	□
M31	Tail sleeve forward	△	○	○	○		
M31	Torque limit effective					○	○
M32	Tail sleeve backward	△	○	○	○		
M32	Torque limit ineffective					○	○
M33	Low chuck pressure	△	△	△	△	△	△
M34	High chuck pressure	△	△	△	△	△	△
M35							
M36	Gear range -N				□		
M37	Gear range -L				□		
M38	Gear range -M				□		
M39	Gear range -H				□		
M45	Turret air coolant ON	△	△	△	△	△	△
M46	One-direction turret swing	○	○	○	○	○	○
M47	M46 cancel	○	○	○	○	○	○
M48	Parts catcher forward	△	△	△	△	△	△
M49	Parts catcher backward	△	△	△	△	△	△
M50							
M51	Error detection OFF	○	○	○	○	○	○
M52	Error detection ON	○	○	○	○	○	○
M53	Chamfering OFF	□	□	□	□	□	□
M54	Chamfering ON	□	□	□	□	□	□
M55	Workpiece counting	△	△	△	△	△	△
M56	Front cover open	△	△	△	△	△	△
M57	Front cover close	△	△	△	△	△	△
M58	Air blast ON	△	△	△	△	△	△

M code	Function	Machine type					
		QT8N (147)	QT15N/18N (341)	QT28N/30N (342)	QT35N/40N (148)	QT8N SP (343)	QT15N/18N SP (344)
M96							
M97							
M98	Subprogram call	□	□	□	□	□	□
M99	Return to main program	□	□	□	□	□	□
M170							
M198	MAZATROL program WNO. call	□	□	□	□	□	□
M199	MAZATROL program WNO. call without same No. repeat	□	□	□	□	□	□
M248	Spindle speed check	○	○	○	○	○	○
M249	Tool change ready	○	○	○	○	○	○
M300	Subspindle side selection					○	○
M301							
M302	Main spindle side selection					○	○
M303	Subspindle forward					○	○
M304	Subspindle reverse					○	○
M305	Subspindle stop					○	○
M306	Subchuck open					○	○
M307	Subchuck close					○	○
M308	Spindle through coolant ON	△	△	△	△	△	△
M309	Spindle through coolant OFF	△	△	△	△	△	△
	Spindle through air coolant OFF	△	△	△	△	△	△
M311							
M312	Workpiece pusher ON					△	△
M313							
M314							
M315							
M316							
M317							
M318							

M code	Function	Machine type					
		QT8N (147)	QT15N/18N (341)	QT28N/30N (342)	QT35N/40N (148)	QT8N SP (343)	QT15N/18N SP(344)
M347							
M348	Continuous movement of parts catcher					△	△
M349	Parts catcher backward end check					△	△
M350							
M351	Spindle speed check ineffective	○	○	○	○	○	○
M352	Spindle speed check effective	○	○	○	○	○	○
M353	Tool change ready operation ineffective	○	○	○	○	○	○
M354	Tool change ready operation effective	○	○	○	○	○	○
M355	T-code completion condition clamp check effective	○	○	○	○	○	○
M356	T-code completion condition clamp check ineffective	○	○	○	○	○	○
M357							
M358	Air blast on subspindle					△	△
M359							
M360							
M361							
M362							
M363							
M364							
M365							
M366							
M367							
M368							
M369							

M code	Function	Machine type					
		QT8N (147)	QT15N/18N (341)	QT28N/30N (342)	QT35N/40N (148)	QT8N SP (343)	QT15N/18N SP(344)
M394							
M395							
M396							
M397							
M398							
M399							
M502							
M505							
M506	This side open, other side closed					○	○
M507	This side closed, other side open					○	○
M508							
M509							
M510							
M511	Starting synchronized movement					○	○
M512	Canceling synchronized movement					○	○
M513							
M514							
M515							
M516							
M517							
M518							
M519	Spindle orient					△	△
M529							
M533							
M534							
M540	Starting TRS-CHK mode					○	○
M541	Ending TRS-CHK mode					○	○

Notes:

- *1 Factory automation equipment and other optional accessories.
- *2 With sleeve confirmation sensor, tail sleeve forward (Factory automation equipment and other optional accessories.) (only universal)
- *3 With sleeve, confirmation sensor tail sleeve backward (Factory automation equipment and other optional accessories.) (only universal)

7-2 Spindle Function

S code

MAZATROL CAM T32B S00000 (In the case of EIA/ISO)
Direct designation of rotation speed

7-3 Tool Function

T code

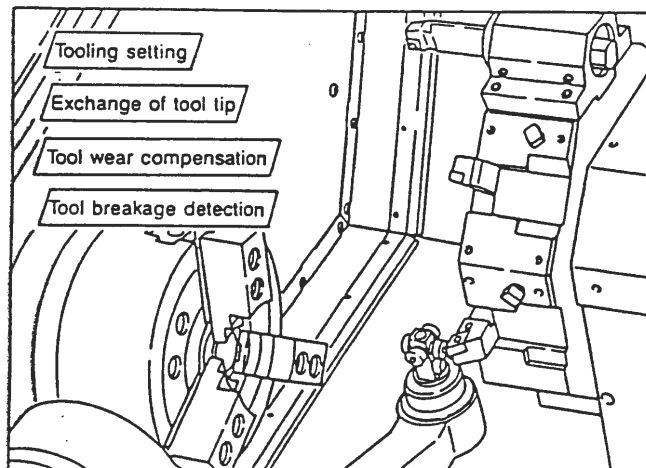
MAZATROL CAM T32B T $\Delta\Delta\Delta\Delta$
 $\textcircled{1}$ $\textcircled{2}$
 (In the case of EIA/ISO)
 $\textcircled{1}$ Tool position No. designation
 $\textcircled{2}$ Tool offset No. designation

7-4 Preparatory Function

G code	Function
G00	Positioning in manual program mode
G01	Linear interpolation in manual program mode
G02	Circular interpolation in manual program mode (clockwise)
G03	Circular interpolation in manual program mode (counterclockwise)
G04	Dwell
G32	Threading in manual program mode

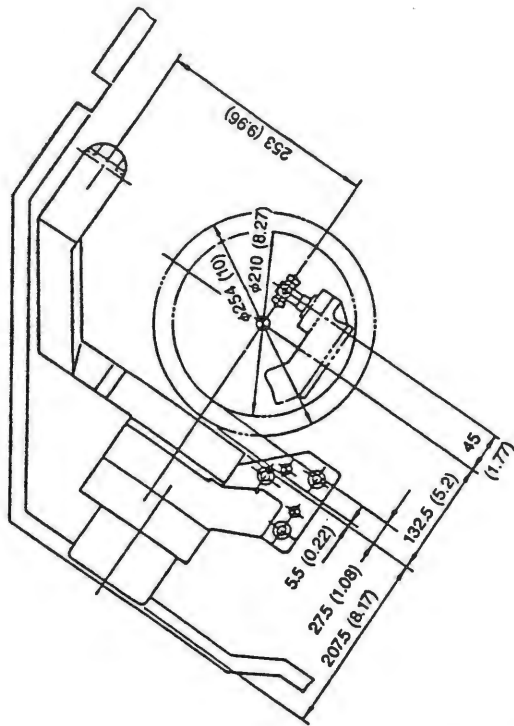
8. TOOL EYE

8-1 Function of TOOL EYE

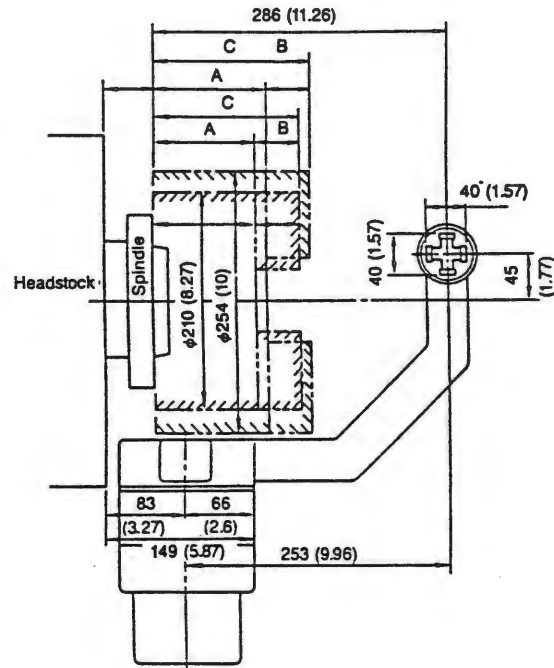


Tool set-ups and insert changes have traditionally been the source of problems resulting in machine idle-time. Each tool's top position must be measured and there is always the problem of tool wear and the possibility of tool breakage which have prevented effective unmanned turning operations. These

8-4 Drawing of the TOOL EYE and the Chuck Showing Dimensions. (QT15N/18N)

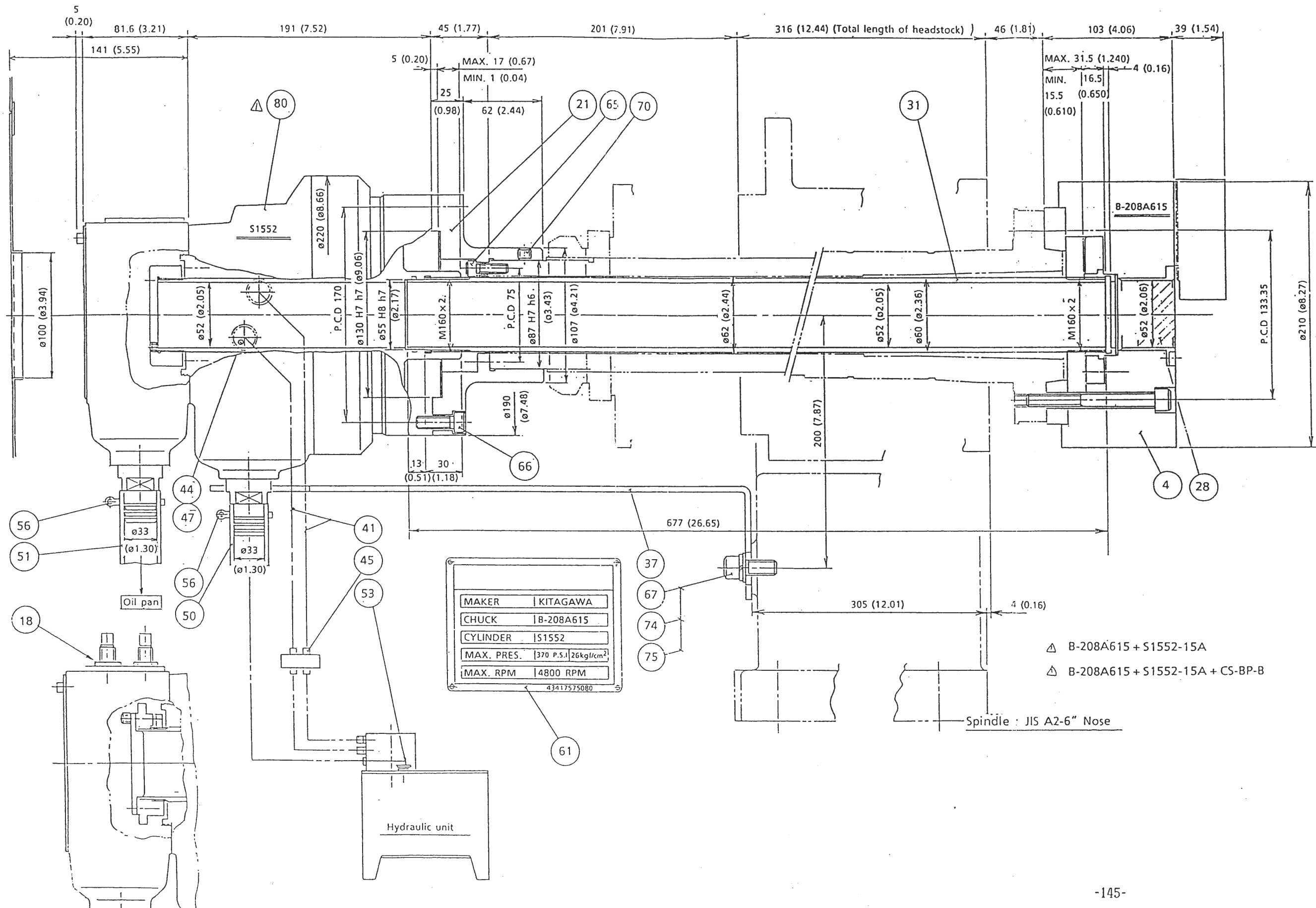


Unit: mm (inch)



Unit: mm (inch)

Power chuck assembly
B-208A615 + S1552 + Recovery system
Confirmation system



9-1-2 Chuck and cylinder for QUICK TURN 18N

(1) 3-jaw chuck (ø10")

Series number	B-208A815
Jaw stroke (Dia.)	8.8 mm (0.346 in.)
Max. clamping diameter	ø254 mm (ø10 in.)
Min. clamping diameter	ø22 mm (ø0.87 in.)
Clamping force (at spindle stop)	11100 kg (24471 lbs.)
Max. cylinder thrust	4300 kg/cm ² (61158 lbs./in. ²)
Max. speed	3700 rpm
GD ²	1.29 kg-m ² (30.60 ft. ² -lbs.) (with standard soft jaws)
Weight with soft top jaws	40 kg (88 lbs.) (with standard soft jaws)
Spindle nose	A2-8
Serration pitch of jaw	1.5 mm (0.06 in.)
Serration angle of jaw	60°

(2) Hydraulic cylinder (Main spindle side)

Type	Hollow type rotating hydraulic cylinder with detection switch and check valve	
Series number	S1875	
Piston area	Push	198 cm ² (30.69 in. ²)
	Pull	183 cm ² (28.36 in. ²)
Piston stroke	22 mm (0.87 in.)	
Max. hydraulic pressure	40 kg-cm ² (568 lbs./in. ²)	
Max. speed	4700 rpm	
Piston thrust (pull)/Max. working pressure	7300 kgf/40 kg-cm ² (16093 lbs./570 lbs./in. ²)	
GD ²	0.38 kg-m ² (9.01 ft. ² -lbs.)	
Weight	26 kg (57 lbs.)	
Drain volume (ISO VG32 50°C 30 kgf/cm ²)	4.2 l/min. (1.1 gal./min.)	

Power chuck assembly
B-210A815A + NT-10" + S-1875-15.Y

